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ON THE SOLUBILITY OF SULPHATE OF MORPHINE.

By Prof. Frederick B. Power, Ph.D.

Read at the Pharmaceutical Meeting, February 21, 1882.

My attention was recently directed, through the reports of the Committee on Descriptive Chemistry of the Pharmacopœia, to the subject of the solubility of sulphate of morphine in water. As all the chemical text-books, and other works which I was able to consult, state that sulphate of morphine is soluble in 2 parts of cold water (Choulant, in Gmelin's "Handbook of Chemistry," vol. xvi, p. 430, Husemann's "Pflanzenstoffe," p. 121, Storer's "Dictionary of Chemical Solubilities," p. 616,[1] etc.), I was surprised to find it stated in the above-mentioned report that the salt requires 15 parts of water at 15°C. (59°F.) for solution. Upon inquiry of my friend, Dr. Charles Rice, I was kindly informed that the commonly accepted factor of solubility is incorrect, and that from recent experiments 15 parts of water are indeed required. That the true degree of solubility of a salt so important, and so frequently employed, should be correctly established would seem very desirable, particularly in view of so considerable a discrepancy.

In Storer's Dictionary, *loc. cit.*, it is stated on the authority of Mohr, Redwood and Procter, in connection with the solubility of the salt, that the cold solution contains 33·33 per cent. of it, which would thus further indicate that in dissolving one part of the salt in 2 parts of water, 3 parts of solution are obtained, or an increase of 50 per cent., presumably by volume.

I have made a few experiments on the subject, which may be of sufficient interest to receive a brief notice.

The sulphate of morphine employed for the determinations was that

[1] Abstracted from "Mohr, Redwood and Procter's Practical Pharmacy," and "Oest. Zeitschrift für Pharm.," 8, p. 201, also, "Canstatt's Jahresbericht für 1854," p. 76.

of Rosengarten & Sons, of this city; it was in the well-known form of light, feathery crystals, and was taken from an original package, recently opened.

Experiment I.—A solution was prepared by digesting sulphate of morphine, in excess, with distilled water at 15°C. (59°F.) for several days, with frequent agitation.

Experiment II.—A concentrated hot solution of the morphine salt in water was allowed to cool to the temperature of 15°C., in order to ascertain whether under these circumstances a supersaturated solution would be formed, which, however, from the analytical results, appears to be not the case.

From the two solutions, as above prepared, and filtered from the excess of the salt, with the proper regulation of temperature, the amounts of sulphate of morphine contained therein was determined by the application of the method suggested a few years ago by Victor Meyer, by precipitating with chloride of barium, and, from the amount of ignited sulphate of barium, inversely calculating the amount of crystallized sulphate of morphine, $(C_{17}H_{19}NO_3)_2.H_2SO_4+5H_2O$.

I. 10·9040 grams of the cold saturated solution gave 0·1396 gram of sulphate of barium, corresponding to 0·4545 gram of crystallized sulphate of morphine, for

$$232{\cdot}8 : 758 = 0{\cdot}1396 : x. \quad x = 0{\cdot}4545.$$

Or expressed in percentage, 4·1682, as

$$10{\cdot}904 : 0{\cdot}4545 = 100 : x. \quad x = 4{\cdot}1682.$$

II. 7·3250 grams of the solution of the salt in hot water, and subsequently allowed to cool to 15°C., gave 0·0946 gram of sulphate of barium, corresponding to 0·3080 gram of crystallized sulphate of morphine, for

$$232{\cdot}8 : 758 = 0{\cdot}0946 : x. \quad x = 0{\cdot}3080.$$

Or expressed in percentage, 4·2047, as

$$7{\cdot}3250 : 0{\cdot}3080 = 100 : x. \quad x = 4{\cdot}2047.$$

The results of these two experiments will be seen to agree very closely, and if, from the percentage strength of the solutions, the amount of water be calculated which is required to dissolve one part of the salt at 15°C., the relation of the two results, disregarding the slight increase of volume produced by solution, will be as follows:

$$\text{I.}\ \frac{100}{4{\cdot}1682} = 23{\cdot}99. \quad \text{II.}\ \frac{100}{4{\cdot}2047} = 23{\cdot}80.$$

Another experiment was made by preparing a saturated solution of

sulphate of morphine at 15°C., filtering into a tared glass capsule, evaporating on the water-bath to dryness, and subsequently heating to 130°C. until the weight remained constant.

8·5880 grams of solution gave 0·3530 gram of anhydrous sulphate of morphine, corresponding to 0·4005 gram of the crystallized salt, or 4·6634 per cent. In this instance the amount of water required for the solution of one part of the salt will be, therefore, approximately, 21·44 parts, or somewhat less than that indicated by the determinations of the previously described method. If, however, the first results be accepted as the more correct, and the method is one which admits of a considerable degree of accuracy, the conclusion must be drawn, that one part of sulphate of morphine requires, in round numbers, 24 parts of water at 15°C. (59°F.) for solution.

It has been recently remarked to the writer, as a result of the practical observations of those who are frequently required to dispense sulphate of morphine, that there is a difference in the degree of solubility of the salt, as produced by the different manufacturers. Whether such a difference really exists, or whether it be simply apparent, I have not had an opportunity of determining, but it is a question of sufficient interest as to merit further comparative determinations.

PRELIMINARY NOTICE OF AN ALKALOID IN THE BARK OF FRAXINUS AMERICANA (White Ash).

By Prof. Frederick B. Power, Ph.D.

In the course of some experiments which were undertaken a few weeks ago by Mr. H. M. Edwards, under my direction, in the chemical laboratory of the Philadelphia College of Pharmacy, our attention was directed to the presence of an alkaloid in the bark under notice. The body in question is apparently quite a strong base, and is, with a considerable degree of probability, the principle upon which the therapeutical virtues of the bark depend; the preparation of the bark which has been most successfully employed for obtaining its specific action being a wine, for which a formula has been given in the last number of this journal by Mr. Thomas S. Wiegand.

The object of this brief notice at this time is primarily to make known the observation, which is attended with special interest from the fact of no alkaloid having as yet been observed in plants of the natural order of oleaceæ, and furthermore, as Mr. Edwards, a stu-

dent of the present class, will not have the opportunity of pursuing the investigation, to request that the further chemical investigation of the subject be reserved for the writer.

The researches herewith connected, embodying the isolation of the alkaloid, its description, composition and properties will be completed and reported upon at the earliest possible date.

HYPOPHOSPHOROUS ACID, HPH_2O_2=66.

By Geo. M. Beringer, Ph.G.

Read at the Pharmaceutical Meeting, February 21, 1882.

The demand for syrups of the hypophosphites containing iron, alkaloids, etc., has been so great the last few years that hypophosphorous acid has become an article of considerable importance. It is easily prepared by decomposing the calcium salt with oxalic acid, filtering, washing the precipitated oxalate of calcium and evaporating the solution to the proper consistence. The acid seems to hold in solution a small amount of the calcium oxalate and deposits some of it on standing. The commercial article is always sold as a fifty per cent. solution. Having occasion to prepare some four or five pounds of the acid a short time ago, I was rather surprised at the difference in specific gravity between it and some we had purchased. I have since examined and determined the percentage of several commercial samples. The results are shown in the following table:

		Sp. Gr.						
No. 1—	Own make—	1·228—	132 grs.	neutralized	53 grs.	Na_2CO_3=50·	per ct.
" 2—	Purchased—	1·155—	"	"	38 "	"	=35·849	"
" 3—	"	—1·134—	"	"	36 "	"	=33·962	"
" 4—	"	—1·160—	"	"	43 "	"	=40·566	"
" 5—	"	—1·124—	"	"	35 "	"	=33·018	"

DETECTION OF MINERAL ACIDS IN VINEGAR.

By J. C. Wharton.

In testing vinegar for *free* mineral acids, there seems to be wanting a ready and simple method of detecting them, as the salts of these acids are regarded as accidental and generally harmless impurities. I would suggest the following, which, though involving well-known reactions, seems to have been overlooked; at least I do not remember to have seen it alluded to by any writer.

The method is to evaporate a portion (about one fluidounce) of the suspected vinegar in a glass or porcelain vessel down to a thick, syrupy extract, just capable of being stirred easily with a glass rod, then let the evaporating dish cool till the hand can bear the heat without feeling unpleasantly warm, or until the dish is about blood-warm, then *stir* into the extract a few grains of finely powdered chlorate of potassium; or if there is no organic extract, or very little, as might result if a very pure article of acetic acid were carefully evaporated, add a small percentage of sugar to the chlorate before mixing it as above directed. If there should be as much as one per cent. of sulphuric acid, the mass would ignite vigorously and I feel confident much less would be indicated by *fire*, and a still smaller quantity, even quite minute, would be made known by the *odor of chlorine*. Muriatic acid would evolve the same odor but produce no fire.

After mixing the chlorate and the extract thoroughly with a glass rod *wait a minute or two*, stirring the mass occasionally, if it does not immediately ignite. Be careful not to place the *face* too near the mixture until several minutes have elapsed, or the ignition may do harm to the eyes. Afterwards the mass may be smelt, to detect the chlorine odor, and if the quantity of mineral acid is minute the dish with its contents may be carefully warmed or even gradually *heated*, smelling occasionally, not too closely, until the dish cools. The extract from pure vinegar does not ignite until the heat is quite painful to the hand if the dish be felt; whereas if sulphuric acid be present the heat will not be very great before the mass burns up with a flare. I am not sure that this test can conveniently be used for the *quantitative* determination of free mineral acid, but think that a method might be devised for conducting the gaseous chlorine into a solution of nitrate of silver, collecting, washing, drying and weighing the precipitated chloride of silver, and, by appropriate calculation, estimating the amount of free acid, having first determined the kind and, if necessary, made a separation of them by available methods which it is not within the scope of this article to detail.

Nitric acid would not be so easily detected, though in skillful hands I think it would appear by manifesting an odor somewhat similar to chlorine (the nitro-muriatic acid odor). But this acid could more advantageously be detected by its action on *copper*, in the form of clean wire or strips, which should be used without the addition of the chlorate of potassium. The above test is very easily made and the chemistry of it is so well understood as to need no further explanation.

Nashville, February 2, 1882.

ON THE ACTIVE CONSTITUENTS OF PODOPHYLLIN.

By Dr. Valerian Podwissotzki.

Abstract from the "Pharm. Zeitschrift für Russland," Nos. 44-50, 1881, by Fred. B. Power.

The experiments of the author on the interesting subject of the constituents of podophyllin, which have been extended over a considerable period, having now been concluded, that portion of the investigation bearing more particularly upon the isolation and description of principles of pharmaceutical or chemical importance and interest may be concisely summarized while the pharmacognostical description of the drug or the history of its introduction and application in pharmacy and medicine, to which in connection with numerous physiological experiments the author has devoted a large share of attention, may be considered so well known in this country as to require no further recapitulation.

According to the author the active constituent of podophyllum, and of podophyllin, is a resinous substance, consisting of a resinous acid, which is without action on the animal organism, and an active neutral body, which latter, when freed from the first mentioned acid, can be obtained in a crystalline form. In combination with the acid it dissolves readily in dilute alcohol, but with difficulty in hot water; when freed from the acid, the neutral body crystallizes immediately in the presence of water, dissolves in ether, chloroform, and strong alcohol, and on the addition of hot water to the latter solution crystallizes out immediately. This body possesses exclusively the active properties of podophyllum and podophyllin, so that the above mentioned resinous matter only acts upon the animal organism when it contains this crystalline body; the acid alone is absolutely without action.

The author disproves the previously advanced view of Buchheim that the active constituent of podophyllin is an easily altered anhydride by the fact that the newly discovered crystallizable substance melts at 200 to 210°C., is not decomposed at 200°C., and only begins to blacken at 260 to 275°C. It also bears very energetic treatment with alkalies without decomposition, as is shown by the description of the method for obtaining it. This circumstance complicated the former experiments considerably, as the neutral body, after the separation of the resinous acid, did not dissolve in aqueous liquids but remained suspended in microscopic form, while the acid is rather readily soluble in aqueous liquids. Former investigators avoided the employ-

ment of alkalies in the treatment of podophyllin, as it was observed that it became less active upon the animal organism. It is found, however, that the active principle of podophyllin or podophyllum can only be isolated by the proper use of alkalies, which remove the resinous acid, without forming with the active principle a chemical compound. To the natural compound the author gives the name *podophyllotoxin.* The very active, crystallizable, neutral body which may be separated from the latter, and which represents a definite chemical body is called *picropodophyllin,* while the acid with which the picropodophyllin is combined in the rhizome and in podophyllin to podophyllotoxin, has received the name of *picropodophyllinic acid.*

The independent existence of podophyllotoxin the author considers must be recognized as well as that of colophony and other resinous substances of the vegetable kingdom, according to its analogy with abietinic acid or certain glucosides, which are accompanied by other substances, after the separation of which the original resin ceases to have an independent existence. As an inactive constituent of podophyllin there was further obtained a crystallizable substance in a chemically pure form, which in its properties is related to quercetin, and which is therefore designated as *podophylloquercetin.* This substance also withstands the action of heat to its melting point of 250°C., and to it are due the variations of color of officinal podophyllin.

Of the results of previous investigations it is confirmed that a body insoluble in ether is contained in officinal podophyllin, which is without action on the animal organism, forming a resinous, amorphous, acid mass, and which bears no relation to the active constituent, picropodophyllin. It is also confirmed that podophyllin contains two fatty substances, decomposition products of different extractive matters, inorganic substances obtained from the rhizome in the process of manufacture and such as arise from the employment of alum in precipitation for the purpose of imparting a yellow color to the product.

Picropodophyllin.—Colorless, silk-like, extremely delicate crystals, which upon drying aggregate to felt-like, shining, silky masses. They are very readily soluble in chloroform, and readily soluble in 90 to 95 per cent. alcohol, but difficultly soluble in 85 per cent. alcohol. Picropodophyllin is so slightly soluble in 50 or even 75 or 80 per cent. alcohol that this can be employed for washing the crystals to remove adhering extractive matters and the calcium or barium compounds of the picropodophyllinic acid. Picropodophyllin is also soluble in ether,

and crystallizes from the warm saturated solutions upon cooling; it is completely insoluble in water, oil of turpentine and petroleum benzin, but soluble in hot fatty oils, from which, upon cooling, it gradually crystallizes. Picropodophyllin is likewise soluble in glacial acetic acid, and crystallizes therefrom on spontaneous evaporation in the form of large, cross-like groups of flat prisms. By the addition of water to the alcoholic solution it is immediately precipitated in the form of fine, long, silky needles. The taste of the solutions is extremely bitter, the reaction neutral. Aqueous ammonia does not precipitate alcoholic picropodophyllin solutions, and when such an ammoniacal-alcoholic solution is heated upon the water-bath until the liquid portion has become expelled, the picropodophyllin is converted into a substance of an acid reaction, incapable of crystallizing, and without action on the animal organism. The same result is obtained by heating the alcoholic picropodophyllin solution, and frequently adding portions of ammonia until the last traces of crystallization disappear, which can easily be controlled by means of the microscope. The ammonia must be allowed to act for a very long time, at the highest possible temperature of the water-bath, and the evaporated ammonia must be frequently renewed by fresh additions. A few grains of picropodophyllin required for this transformation from 4 to 6 ounces of concentrated ammonia water. Picropodophyllin dissolves very readily in picropodophyllinic acid; the behavior of these solutions will be described further on. Alcoholic solutions of picropodophyllin produce the same effect when brought into the animal stomach as podophyllin, although much more active. For this purpose only such solutions can be employed from which it does not separate, and consequently hot solutions in dilute alcohol or oil do not come into consideration. 4 centigrams (0·6 grain), when brought into the stomach with the precautions required to prevent its crystallizing out, killed a full-grown cat after frequent vomiting and incessant mucous evacuations, death occurring within from 20 to 24 hours. 6 centigrams (0·9 grain) of officinal podophyllin given to a cat produced simply evacuation of the bowels and vomiting, but the animal did not die, and had completely recovered in a few days. Picropodophyllin is the more violent and rapid in its action the less it crystallizes out from its solutions in the animal organism. On subcutaneous injection it crytallizes in the same spot in which it is injected, and produces absolutely no effect. It is not changed by acids. Its melt-

ing point is from 200 to 210°C.; at 200°C. it is not decomposed but forms a soft crystalline mass, possessing all the properties of picropodophyllin. Several elementary analyses gave carbon 67·71, hydrogen 5·31 and oxygen 26·98.

Podophyllotoxin is a very bitter, amorphous substance, soluble in dilute alcohol and hot water; from the latter solution it is precipitated very slowly upon cooling in the form of fine flakes, so that the water retains the bitter taste for 24 hours. From the alcoholic solution it is likewise precipitated, but very slowly as an extremely fine powder on the addition of a considerable amount of water. It is most readily soluble in chloroform, but is also soluble in ether when completely free from podophyllinic acid; it is insoluble in petroleum ether, and has a slightly acid reaction. Alcoholic solutions of podophyllotoxin are completely neutralized by warming with the alkaline earths. Aqueous solutions of the caustic alkalies, potassa and soda, neutralize the acid portion of podophyllotoxin without warming; ammonia water neutralizes likewise, and after its evaporation the acid reaction again appears. On the neutralization of the etherial solutions of podophyllotoxin with lime or baryta water, a portion of it passes into the aqueous solution while the other portion crystallizes from the ether in the form of white silky needles. With the aid of the microscope this phenomenon can be observed immediately after the addition of the solution of the alkaline earth to the etherial podophyllotoxin solution. The crystals thus formed are picropodophyllin. When the solution of podophyllotoxin in ammonia water or in dilute alcohol, in which picropodophyllin is insoluble, is neutralized, the latter crystallizes in small, fine, stellate groups of crystals, which with the resinous picropodophyllinic acid (accompanying the podophyllotoxin) form spheroidal granules. These spheroidal formations solidify in saturated alkaline solutions of picropodophyllinic acid to a jelly-like mass. If the alkaline compound of the acid of podophyllotoxin is now decomposed by any acid which with the alkali forms a soluble salt, then one can obtain separately the crystalline picropodophyllin, as also the acid of the podophyllotoxin with which the separated picropodophyllin was associated. The acid of the podophyllotoxin is the above-mentioned picropodophyllinic acid. The separated picropodophyllin becomes dissolved in the picropodophyllinic acid by long-continued heating, and by the evaporation of this solution to dryness, an amorphous, resinous substance is again obtained which possesses all the properties

of podophyllotoxin, *i. e.*, when treated as above mentioned, it yields picropodophyllin in the form of snow-white crystals, etc. By the precipitation of the alcoholic solution of this horn-like mass, pulverulent podophyllotoxin is obtained; this succeeds still better when the solution in chloroform is precipitated with petroleum ether. The elementary analysis of podophyllotoxin is given in the further description of picrodophyllinic acid. Podophyllotoxin is admirably assimilated by the animal organism, as well by the introduction of its solutions in very dilute alcohol into the stomach as also by sub-cutaneous injection. The action is precisely the same as with picropodophyllin, since this forms exclusively the active principle of podophyllotoxin, the latter acts even more quickly, as in the organism the picropodophyllin cannot crystallize from the podophyllotoxin solutions unless free alkalies are present in the stomach, or have been added to the medicine containing the podophyllotoxin; the separation of the picropodophyllin then takes place in proportion to the amount of free alkali present. Pure podophyllotoxin forms a white, resinous powder, which is completely soluble in chloroform, and in the latter solution the addition of ether should not produce a flocculent precipitate, which would indicate an admixture of podophyllinic acid. The podophyllotoxin solution should also not produce a dark-brown color with ferric chloride, indicative of an admixture of podophylloquercetin.

Picropodophyllinic acid is in respect to its action without significance, but is so far of interest, as it holds in solution the only active, and in water insoluble, constituent of the officinal podophyllin,—the crystalline picropodophyllin,—and renders the latter for the animal organism capable of assimilation. The acid is with great difficulties freed from the last traces of picropodophyllin, which, after the neutralization of the picropodophyllinic acid by means of alkalies, crystallizes out. It is a resinous acid, separates on the addition of water to the alcoholic solution, and is precipitated in a flocculent form when the aqueous solutions of its compounds with the alkaline earths are acidulated. If these flocculent precipitates be dried, they form granules of a horny appearance, which are readily soluble in alcohol, chloroform and ether. After the decomposition of the above compounds by acids, a portion of the picropodophyllinic acid remains at first dissolved in the water, but is gradually also precipitated in a flocculent form. In hot water the acid is soluble, but separates again upon cooling. Of more interest are the relations of picropodophyllinic acid to picropo-

dophyllin, which latter is concealed to a certain extent by the separation of the former, and this behavior causes the gelatinous-like coalescence of officinal podophyllin on treatment with alkalies.

If podophyllotoxin, having an acid reaction, be mixed with the aqueous solution of an alkaline earth, *e. g.*, with lime or baryta water, and warmed upon the water-bath with the occasional addition of fresh portions of the alkaline earth solution, until the podophyllotoxin, which slowly dissolves, has become perfectly neutralized, a solution is formed which is only slightly turbid, from small amounts of impurities; upon cooling, this solution solidifies to a gelatinous mass, which, from a more concentrated solution, can be obtained in the form of adhering lumps. If to the hot filtered solution an acid be gradually added, forming with the barium or calcium a soluble salt, a flocculent precipitate is produced which, under the microscope, appears as a granular, transparent, gelatinous mass, in the spheroidal granules of which exceedingly delicate, stellate crystalline forms may be observed. The liquid is now filtered, and the precipitate on the filter is washed until the acid is completely removed. The residue upon the filter is dissolved in water by the aid of heat, and filtered into a previously warmed evaporating dish. Upon slowly cooling, snow-white, radiating groups of crystals are formed within the gelatinous mass, and the entire substance becomes subsequently like jelly. Under the microscope the entire mass is seen to consist of the previously mentioned spheroidal granules, mixed with delicate, needle-like bundles; the crystals are picropodophyllin, while the transparent, gelatinous, granular mass consists of resinous picropodophyllinic acid, in which a portion of the picropodophyllin is dissolved and another portion crystallized; for free picropodophyllin, when not dissolved in the resinous picropodophyllinic acid or glacial acetic acid, can only appear in the presence of water in the crystalline form. When the water is removed from the gelatinous mass by evaporation on the water-bath, there appear with the increased concentration snow-white, needle-shaped crystals, which, after the complete removal of the water, fill the entire vessel, and form a compact felt-like aggregation. The reaction of this crystalline mass is acid, and in consideration of the uniformity of the snow-white crystals, they could be easily presumed to be the crystallized picropodophyllinic acid. The author himself was led to this incorrect supposition, but finally succeeded in separating from the crystalline mass two special bodies. On treating the mass with ammo-

nia, for the purpose of neutralization, it was observed that the snow-white crystals remained undissolved, while the ammonia solution became neutral. The liquid portion was warmed upon the water-bath, and after the removal of the last traces of water, the free ammonia is not only volatilized, but also that in combination with the organic acid of the podophyllotoxin, so that the reaction again becomes acid. The latter substance is nearly colorless, and forms, after drying completely, horn-like laminæ or granules, which are readily soluble in even very dilute alcohol, in ether and chloroform, but in water only by the aid of heat. These laminæ or granules are picroyodophyllinic acid; in the latter the crystallized picropodophyllin dissolves, whereby the above-mentioned gelatinous liquids are formed, as also the spheroidal forms with the enclosed crystals. From these artificial solutions the crystallized picropodophyllin can again be obtained. Picropodophyllinic acid forms with barium and calcium neutral compounds, in which the picropodophyllin dissolves by warming upon the water-bath, but crystallizes out after the removal of these bases by other acids. By the continued action of ammonia, the picropodophyllinic acid is partially decomposed, becomes brown and insoluble in water; with caustic alkalies it likewise yields neutral compounds, in which the picropodophyllin at first dissolves, but some time after crystallizes out.

The average of several elementary analyses gave for podophyllotoxin carbon 67·62, hydrogen 7·46 and oxygen 24·92, and for crystallized picropodophyllin, carbon 67·71, hydrogen 5·31 and oxygen 26·98. The analysis of picropodophyllotoxin, of different operations, gave somewhat varying results, which is attributed to the difficulty of freeing it from the small amounts of adhering podophyllinic acid and podophylloquercetin. The analysis of the picropodophyllinic acid presents still greater difficulties, as it is impossible to obtain it chemically pure; before the treatment with ammonia it always contains traces of picropodophyllin, and after the action of ammonia, which is the only method of freeing it completely from picropodophyllin, it contains again new decomposition products which are formed by the action of the former. The picropodophyllinic acid possesses further no pharmacological interest.

Podophylloquercetin.—This crystallizes in the form of very short needles, having a yellow color and metallic lustre. Upon the animal organism it has neither emetic nor cathartic properties. In the use of officinal podophyllin the pains observed in the intestinal canal appear

to be due to the presence of podophylloquercetin, as with animals the pains produced in the abdomen after the administration of podophyllotoxin could only be observed in those cases in which with the latter podophylloquercetin was intentionally mixed. The podophyllinic acid of other authors does not produce these effects. Podophylloquercetin is readily soluble in alcohol and ether, sparingly in chloroform, and completely insoluble in water; with ammonia and caustic alkalies it gives fine bright yellow solutions, and with the alkaline earths insoluble bright yellow compounds. Podophylloquercetin is usually obtained in the form of a yellow amorphous powder, but may with difficulty be obtained from its ethereal solution in crystals. By the prolonged action of ammonia and other alkalies it becomes brown, and is partially converted into an uncrystallizable resinous mass, and partly into dingy acid products of decomposition. By exposure to air, even when perfectly pure, it becomes gradually green, and to this the occasional greenish color of officinal podophyllin is attributed. The melting point of podophylloquercetin is 247 to 250°C.; when melted it begins to blacken, and sublimes partially, being condensed on the cooler parts of the tube in the form of very small shining, needle-like crystals. Ferric chloride colors the solutions dark green, and the microscopic crystals above mentioned are likewise colored. Neutral acetate of lead produces in the solutions orange-yellow precipitates, which are soluble in acetic acid. Submitted to elementary analysis, it gave carbon 59·37, hydrogen 4·01 and oxygen 36·62, and appears to resemble in many respects the other varieties of quercetin.

Podophyllinic Acid.—By this name the author designates the brown amorphous resinous matter which is insoluble in ether and petroleum ether, but soluble in alcohol and chloroform; it is insoluble in water, and exerts, therefore, like the remaining accessory constituents of podophyllin, no action upon the animal organism. The impure appearance of podophyllotoxin, when it has not been treated with ether, depends always upon its admixture with podophyllinic acid.

Fatty Substances.—The fatty oil of officinal podophyllin is always of a greenish color, and is only brown when in the preparation of the podophyllin alum solution has been employed. Another fatty substance, which is dissolved in this oil, crystallizes therefrom in the form of colorless, cholesterin-like laminæ; the fatty oil possesses a peculiar odor, which resembles that of the podophyllum rhizome.

The *extractive matters* of officinal podophyllin, of which nothing special can be said, are all of a dirty grayish-brown color, and of the consistence of sticky, soft resins; they are without action on the animal organism.

Methods of Obtaining the Constituents.—Pure podophylloquercetin can be obtained best from podophyllin prepared specially for this purpose. All the other above-mentioned bodies, with the exception of the picropodophyllinic acid, can be obtained more conveniently and purer from the rhizome than from commercial podophyllin. The picropodophyllinic acid can only be obtained from the podophyllotoxin.

The podophyllotoxin is perfectly adapted for therapeutic uses, being readily assimilated by the animal organism, as proved by clinical experiments made with it in Vienna, and also by the experience of private practice. The crystallized picropodophyllin is in this respect less applicable on account of its unfavorable conditions of solubility.

The best and simplest method for obtaining pure podophyllotoxin for medicinal use is the following: Podophyllum in coarse powder is extracted by digestion with chloroform for 2 days at ordinary temperatures in a glass vessel or percolator, with frequent agitation. If a glass vessel is used, the product of the first digestion is poured off, a fresh portion of chloroform added, again decanted, and subsequently a third portion of chloroform added, whereby each time an amount of chloroform equal to or somewhat more than that of the weight of the podophyllum should be employed. If a percolator is used, fresh portions of chloroform are added until the powder is completely exhausted, and the chloroform subsequently displaced by means of water. The chloroform used must be as free as possible from alcohol, otherwise the extracted matter will contain considerable amounts of podophylloquercetin and podophyllinic acid, which render the purification of the podophyllotoxin difficult. For the same reason the podophyllum is extracted at ordinary temperatures and not upon the water-bath. From the collected and combined liquids the chloroform is distilled off until a residue of a syrupy consistence remains; this is gradually added to 2 volumes of pure absolute ether, or the same portion of ether is gradually added to the chloroform residue, stirring with a glass rod, until by the further addition of ether a flocculent separation is no longer formed. Podophyllotoxin and the fatty substances dissolve in the ether-chloroform, while the

podophyllinic acid is separated in a flocculent form. An insufficient amount of ether with an excess of chloroform leads to the result that a portion of the podophyllinic acid remains in solution, while an excess of ether on the contrary is without injury but rather of benefit in obtaining a proportionately purer preparation; the excess of ether can only in so far be inconvenient as that larger amounts of petroleum ether will be subsequently required to precipitate the podophyllotoxin.

Ether containing alcohol must be absolutely rejected, as then a portion of the podophyllinic acid which is readily soluble in alcohol will remain in solution in the mixture of ether and chloroform, and it is not possible to remove this acid by further treatment. By the aid of ether one can determine whether podophyllinic acid is still contained in the respective liquid; to this purpose ether is allowed to flow in a thin stream on the sides of the capsule containing the podophyllotoxin solution, and it is observed whether floccules are formed. The podophyllinic acid is deposited at the close of the operation and in the course of time in the form of dense lumps on the bottom of the capsule. The liquid decanted from the residue is brought upon a filter and allowed to flow directly into 20 times the amount of pure cold petroleum ether. From each drop falling into the petroleum ether a white powder is separated, while the fatty substances (the fatty oil and crystallive fatty matter) remain in solution. If altogether too small an amount of petroleum ether is employed with an excess of the chloroform-ether mixture, the deposited powder agglomerates or forms small lumps, which partially retain the fatty substances; with the use of a proportionately large excess of the chloroform-ether a portion of the powder becomes dissolved. The agglomeration to small lumps occurs more readily in proportion to the incompleteness of the removal of the podophyllinic acid; the podophyllotoxin must then be subjected to additional purification, for which purpose to the liquid in which in part podophyllotoxin is still contained dissolved fresh portions of petroleum ether are added until complete precipitation is effected.

The precipitate is filtered from the petroleum ether and dried at a temperature not exceeding 35°C. The residue is again dissolved in the smallest possible quantity of chloroform, the solution brought upon a filter, and again allowed to drop into a sufficient amount of petroleum ether, whereby a few drops of water are added in order that the precipitated powder may become slightly moistened with water.

The powder is allowed to completely deposit, for which a repose of 24 hours is sufficient, and, after carefully removing the water, it is brought upon a filter, the petroleum ether allowed to drain off, and the residue dried at the above mentioned moderate temperature. By proper treatment there is obtained upon drying an almost completely white or slightly yellowish-white powder of podophyllotoxin. The latter is not decomposed by light and can therefore be preserved in ordinary glass vessels.

Podophyllotoxin can also be obtained from the officinal podophyllin, although it must hereby be considered that the latter contains not only considerable amounts of podophyllinic acid and podophylloquercetin, but also many products of decomposition which are formed by the extraction of the rhizome with boiling alcohol and subsequent evaporation of the solutions. These decomposition products are readily taken up by chloroform and it is afterwards difficult to separate them from the podophyllotoxin; the latter prepared from the officinal podophyllin is always of a more yellow color than that obtained from the rhizome; the method of obtaining it is the same as that above described.

Pure podophyllotoxin must dissolve readily in chloroform, and this solution should give no precipitate on the addition of ether. Ferric chloride should not color it green and on the addition of petroleum ether to the chloroform solution it must be precipitated as a white powder. In ammonia water it should not be completely soluble; ammonia should dissolve simply the picropodophyllinic acid from the podophyllotoxin, which solution on standing for some time becomes somewhat colored; the picropodophyllin must hereby separate out, in consequence of which, if the amount of ammonia is not too large, a thick gelatinous mass is obtained. If to this mass or to a mixture of podophyllotoxin and ammonia ether be added, gently warmed and agitated, the picropodophyllin should dissolve in the ether, and, after cooling and volatilization of the latter, it should crystallize out in the form of delicate, colorless crystals.[1]

The preparation of pure crystallized picropodophyllin can be effected as easily from the officinal podophyllin as from the podophyllum rhi-

[1] The method here described for obtaining podophyllotoxin, by means of which the podophyllinic acid is completely removed, is an improvement and addition to that previously published by the author in "Archiv für exper. Pathologie und Pharmacologie."

zome; as the starting point, however, podophyllotoxin should be selected.

In the preparation of podophyllotoxin for obtaining picropodophyllin, the former does not require to be freed from the podophyllinic acid. From every variety of officinal podophyllin the podophyllotoxin must be extracted in the same way as from the podophyllum rhizome; the concentrated chloroformic solution, however, does not require to be mixed with petroleum ether, and this relatively expensive operation can be avoided by evaporating the chloroformic solution upon the water-bath until the chloroform has completely volatilized, and subsequently boiling the residual brownish-yellow mass with fresh portions of petroleum ether until greenish fatty matters are no longer taken up and the entire mass is converted into a granular powder.

During the boiling the mass must be continually actively mixed with the petroleum ether, in order that it become thoroughly penetrated. After the removal of the fatty matters, it swells up, and finally falls to a powder, which consists of impure podophyllotoxin with the adhering impurities.

In order to prepare the crystallized podophyllotoxin, the obtained powder is dissolved in a small amount of alcohol, and a considerable excess of freshly slaked lime added; the mixture is then evaporated on the water-bath to dryness, with constant stirring. The granular powder obtained by evaporation with lime is finely powdered, brought into a glass flask, and boiled on the water-bath with absolute or at least 90 per cent. alcohol. The alcohol thus takes up the picropodophyllin from the lime mixture, and the solution is brought upon a previously warmed filter. The funnel with the filter must of necessity be heated with warm water, otherwise a considerable amount of podophyllotoxin will crystallize out on the filter, become mixed with the lime powder, and retard the filtration. From the sufficiently concentrated alcoholic liquid the picropodophyllin crystallizes out upon cooling in long, snowy, silk-like crystals. The lime powder remaining on the filter is boiled with fresh portions of alcohol as long as anything is taken up and upon cooling needle-shaped crystals continue to be separated. The picropodophyllin crystals are collected on a filter, and washed with 50 per cent. alcohol to which a little of an aqueous or alcoholic solution of ammonia has been added; the 50 per cent. alcohol dissolves the foreign colored admixtures, while the ammonia removes the last traces of the picropodophyllinic

acid. The properly washed picropodophyllin crystals aggregate to a felt-like mass; after drying at a moderate temperature on the filter they are finally obtained in the form of a snow-white mass, having a silky lustre. The alcoholic picropodophyllin solutions have an intensely bitter taste. The alcoholic filtrate and wash liquids are concentrated on the water-bath to a small volume, and the picropodophyllin still contained therein allowed to crystallize out.

Preparation of the Remaining Constituents of the Officinal Podophyllin.—The picropodophyllinic acid can be isolated from the podophyllotoxin by treating the latter with ammonia water. It is, however, very difficult to obtain the pure acid in an amount sufficient for chemical examination, as ammonia water, which is the only substance which can be employed for its isolation, causes its decomposition. The resinous podophyllinic acid is separated in the process for podophyllotoxin, when to the chloroform solution of the impure principle ether is added. Absolutely pure podophyllinic acid is obtained when the precipitate produced by ether is further carefully washed with ether for the purpose of removing the podophyllotoxin; this operation, however, is wearisome, as the precipitate must be treated several times with chloroform and ether.

The fatty matters may both be obtained from the petroleum ether solutions which remain from the preparation of the podophyllotoxin. The petroleum ether is either distilled off or expelled by evaporation, whereby the crystalline fatty matter crystallizes out from the residue upon long standing. It is pressed between bibulous paper and purified by repeated solution and recrystallization.

Podophylloquercetin can be best obtained from such varieties of podophyllin as have been prepared without the employment of alum water. From the podophyllin all the constituents which are soluble in chloroform and petroleum ether are first removed, the residue dried, and then treated with ether, whereby the podophylloquercetin is chiefly dissolved, with only small admixtures of foreign products. The ether is then dissipated by evaporation at the lowest possible temperature, and the residual yellowish body treated with acetate of lead, with which the podophylloquercetin forms a compound of a yellow color, soluble in acetic acid. This compound is decomposed in the usual way, the podophylloquercetin taken up with ether, which becomes thereby of a yellow color, and the podophylloquercetin finally obtained in the form of a yellow powder which, by exposure to the

air, gradually assumes a greenish color. From the ammoniacal solution it is precipitated by ether in the form of microscopic crystals. By the sublimation of the yellow powder obtained after the evaporation of the ether, yellow vapors are formed which, upon cooling, form well-developed, yellow shining, needle-shaped crystals of podophylloquercetin.

The author finally again calls attention to the fact that the action of podophyllin is due to the therein contained neutral and crystallizable picropodophyllin, which is dissolved in the picropodophyllinic acid, forming together the resinous podophyllotoxin, but does not consider the latter a chemical compound, as would be found in the case of the combination of an acid and alkali. He also explains the observations of previous experimenters that the action of podophyllin is diminished or destroyed by the influence of alkalies, from the fact that the picropodophyllinic acid with which the active picropodophyllin is associated becomes thereby neutralized, thus rendering the latter insoluble. In the administration of podophyllin or podophyllotoxin, therefore, its combination with alkalies, soap, etc., should be avoided, and in case too large a dose has been inadvertantly employed the proper antidote would be Seidlitz powder, magnesia, or any alkaline draught, which may be followed by emulsion of sweet almonds with cherry-laurel water, or simply the former alone.

The normal dose of podophyllotoxin for an adult, as based upon clinical observations and experiments upon animals, is suggested as ¼ grain, to be taken at bed time, and repeated on the following night, if required. In obstinate cases of constipation ½ grain may be given at once, but the maximum dose should not exceed ⅔ grain. A dose of 2½ grains, if not fatal, is considered very dangerous and absolutely inadmissible. For the rapid assimilation of the substance the following formula is recommended as convenient of application:

℞ Podophyllotoxin, ... grs. iiss
solve in
Alcohol, ... ℈x=fʒiv

S. Dose for an adult 30 drops in wine or brandy.

For children the dose must be proportionally less, and may be given in a spoonful of sweetened water or milk.

It may finally be incidentally observed that the author confirms the observations of previous investigators in regard to the absolute absence of any body of an alkaloidal nature in podophyllum.

PRACTICAL NOTES FROM FOREIGN JOURNALS.

BY THE EDITOR.

Glycerite of Bismuth is best prepared, according to A. Bareau, by triturating the bismuth salt intimately with the requisite quantity of starch and about 5 or 6 parts of water and adding this mixture, with continual agitation, to the glycerin, previously heated to near the boiling point.—*L'Union Phar.*

Lac Ossium is prepared by saturating somewhat diluted hydrochloric acid, by digestion, with bones burned to whiteness, cooling, filtering and evaporating the liquid until it has the specific gravity 1·200. Of this liquid 500 grams are diluted with 6,000 grams of distilled water, poured into a cold solution of 330 grams of pure sodium carbonate in 6,000 grams of distilled water, and the precipitate is washed by decantation until the washings cease to react with nitrate of silver. The yield is 3,000 grams. It is important that the precipitation be effected in the cold and from a strongly diluted solution.—*Phar. Ztg.*, No. 89, 1881; *Phar Weekbl.*

Saccharated Iodide of Iron, according to A. Jandous, may be rapidly prepared by dissolving iron with iodine in the presence of 50 per cent. alcohol; no secondary products are formed, and the final exsiccation is accomplished in so short a time that the preparation may be almost made extemporaneously.—*Phar. Post*, No. 24, 1881.

Tectrion is the name given to a solution of magnesium chloride, recommended for use as a non-freezing liquid. It is, however, not adapted for gas meters, since it corrodes iron. It has also been used for increasing the weight of dyed yarns. In 1865 magnesium chloride was recommended by Dr. A. Frank in the preparation of fire-brick for puddling furnaces.—*Zeitsch. Oest. Ap. Ver.*, 1881, p. 446.

Preparation of Butter of Antimony.—Liquor stibii chlorati of the German Pharmacopœia is of variabe composition, owing to the impurities present in the crude material. Prof. E. Reichardt recommends the following process for its preparation: 1 part of powdered sulphuret of antimony is mixed in a capacious flask with 4 parts of crude hydrochloric acid, and the mixture gradually heated to boiling, and until sulphuretted hydrogen is no longer evolved in the presence of undecomposed black antimony. The liquid is filtered, diluted with 6 volumes of water, the precipitated antimony oxychloride washed upon a filter with water and dried between 20 and 30°C. One part of the

air-dry powder is treated for 24 hours with 3½ parts of pure hydrochloric acid and with frequent agitation, but without heat, when the liquid is filtered; the proper specific gravity, 1·34 to 1·36, is obtained either by dilution with hydrochloric acid or by evaporation in a water bath.

Thus prepared it is a colorless or pale yellowish liquid, which is completely volatilized by heat, and when diluted with 5 parts of water yields a perfect solution on the careful addition of sulphuric acid (absence of lead). Treated with an excess of ammonia and filtered, the liquid is clear and not blue (absence of copper). When heated to 50 or 60°C. (122 to 140°F.) a current of sulphuretted hydrogen should not cause the separation of either sulphur or sulphide of arsenic.—*Archiv d. Phar.*, Nov., 1881, p. 347.

Extractum Krameriæ.—Prof. E. A. Vander Burg has made a number of experiments with the view of determining the causes of the different behavior of commercial extract of rhatany. The Peruvian root exhausted by cold water yielded 10·5 per cent., and by decoction 18·5 per cent. of extract, while Savanilla rhatany gave 14·75 and 20·50 per cent. Of these extracts that of the Peruvian root, prepared with cold water and by evaporation *in vacuo*, was of a light red color (not brown), readily and completely soluble in water, had the strongest astringent taste, and gave the strongest reactions for tannin; a one per cent. solution yielded with lead acetate a nearly white, slightly rose-colored precipitate, with ammonia a bright blood-red color, and with lime water a light red precipitate. The corresponding reactions with the other extracts were mostly much darker, as were also the precipitates with cinchonine sulphate and with tincture of iodine. For the preparation of *syrupus iodotannicus* 0·1 gram iodine was dissolved in 2 cc. alcohol, of spec. grav. ·828, and the solution mixed with 0·4 gram of extract, previously triturated with 4 cc. water; with the extract prepared by cold water and evaporation *in vacuo* the reaction of free iodine had completely ceased in 24 hours, while it was still evident with all the other extracts after six weeks, evidently due to the decomposition of a portion of the tannin during the preparation.

No characteristic difference could be observed between the extracts prepared from the cold infusion by evaporation at the ordinary temperature, in the water-bath or over the naked fire; nor between the extracts prepared from decoctions of the root and evaporated in the manner indicated; the latter extracts were invariably dark in color,

and with reagents yielded the darkest colored reactions. The Savanilla extracts were always darker than the corresponding extracts from Peruvian rhatany. Commercial *extractum krameriæ americanum* agreed in all respects with the extract obtained from Savanilla rhatany with cold water; but the commercial rhatany extract "in lamellis" differed to such an extent from all extracts prepared from Peruvian and Savanilla rhatany, as to warrant the inference of its being prepared from an entirely different drug; it has no astringent taste, is but slightly soluble in strong alcohol, its aqueous solution yields a strong precipitate with alcohol, and the precipitates with all reagents had a color differing materially from the precipitates obtained with the other extracts.—*Phar. Ztg.*, 1881, No. 103; *N. Tydschr. voor Phar.*, Oct.

Tannin of Oakbark is obtained by treating the alcoholic extract with water and saturating the solution with sodium chloride, when tannic anhydride will be deposited. On agitating the liquid with ether, some gallic and ellagic acid is removed, and on agitating now with acetic ether the tannin dissolves, and on evaporation, is left as a reddish-brown brittle mass, which gives with ferric salts a blue-black, and with tartar emetic, gelatin, albumen and alkaloids, yellowish-white precipitates. The formula for the anhydrous tannin is $C_{28}H_{24}O_{12}$; it is not a glucoside, but on treatment with dilute acids yields oak-red, $C_{28}H_{22}O_{11}$.—*Zeitschr. Anal. Chem.*, xx, 208–223.

Administration of Tannin.—The unpleasant effects often observed on giving solution of tannin or powdered tannin are, according to Dr. L. Lewin, entirely obviated by combining it with albumen. On adding the filtered solution of one white of egg in 100 grams of water to a 1 or 2 per cent. solution of tannin, and agitating the mixture well, an opalescent slightly milky liquid is obtained, which has a far less astringent taste than the simple solution of tannin, and, suitably diluted, may even be given to babies with good result.—*Parm. Post*, 1881, p. 427.

Solubility of Chinoline Compounds.—Dr. Julius Donath experimented with chinoline salicylate prepared by E. Schering, and found it to be not completely soluble in 100 parts of water, and the paraoxybenzoate of chinoline even in 120 parts of water. Both salts do not even yield a one per cent. solution with alcohol of 10 per cent., although both are freely soluble in strong alcohol; they cannot, therefore, be easily administered in liquid form, and no observations have been made with their administration as powder, followed by strongly alcoholic or

by acidulous drinks. Chinoline tartrate seems to deserve the preference of all known compounds of the alkaloid, the solubility being intermediate between the deliquescent compounds with mineral acids, and the sparingly soluble ones with the aromatic acids.—*Phar. Ztg.*, 1882, No. 2.

Large Dose of Chloral Hydrate.—Contrary to the physician's directions, a man suffering from delirium tremens took in about half an hour 15 grams of chloral hydrate without any ill effects. The editor of "Pharm. Zeitung" (1881, No. 98) directs attention to a case which occurred in Elberfeld in 1874, and in which the same dose, 15 grams, produced death. The maximum dose of chloral hydrate is, in Germany, assumed to be 3 to 4 grams, and in a day 8 grams.

Toxic Effects of Monobromated Camphor were observed by Prof. M. Rosenthal, 1 gram being taken in one case and in another 3 grams, the patient remaining unconscious for six hours, recovering consciousness only after violent vomiting. The treatment recommended consists in giving an emetic, afterwards acetic ether, coffee with rum, and in case of a considerable reduction of the temperature of the body, in friction with warm clothes, etc.—*Phar. Ztg.*, 1881, No. 94.

Compound of Strychnine with Iodoform.—According to Lextrait such a compound may be obtained when 5 grams of crystallized iodoform and 12 grams of strychnine are dissolved in about 500 cubic centimeters of 85 per cent. alcohol at a temperature approaching the boiling point. After 24 hours crystals separate from this solution, which are washed with a little alcohol, quickly pressed between bibilous paper, and dried with exclusion of the light and air. The compound has the composition $(C_{21}H_{22}N_2O_2)_3CHI_3$. It is decomposed by light with the separation of iodoform. It is insoluble in both hot and cold water; alcohol of 98 per cent. dissolves 3·40 grams in a liter at 15°C.; in ether and chloroform it is likewise soluble. On being heated to 90°C., it begins to decompose, and chars at 130°C. With boiling water it is decomposed with the volatilization of iodoform, while stychnine remains; the alcoholic solution suffers a partial dissociation, so that it is easy to purify the compound by repeated crystallization from alcohol without a large portion becoming decomposed. With quinine iodoform appears to form a similar compound.—*Pharm. Zeitung*, No. 94 from *Journ. Pharm. Chem.*

A Correctant of the Odor of Iodoform.—Otto Ruetz finds the substance best adapted for diminishing or concealing the disagreeable odor of

iodoform to be the oil of thyme, to which a little thymol may be advantageously added. It is preferable to oil of peppermint, oil of bitter almond, etc., and, as an example, it is stated that for a solution of from 1 to 2 grams of iodoform in 30 grams of collodion the addition of 1 decigram thymol is sufficient.—*Ibid.*

Pilocarpine as an Antidote for Atropine is recommended by Dr. Joseph Kauders. It is employed by injecting 1 to 3 centigrams hypodermically at intervals of from 30 to 50 minutes until the action of the pilocarpine is produced. He also calls attention to the probability of the successful application of atropine as an antidote for pilocarpine.—*Ibid.*, from *W. Med. Wochenschr.*, No. 45.

Extract (Esprit) Ylang-Ylang.—Best oil of ylang-ylang 10 grams, oil of rose 2 drops, oil of orange flowers 10 grams, tincture of musk 20 to 30 grams, spirit of jasmine 900 grams, orange flower water 100 to 150 grams.—*Phar. Ztg.*, 1881, No. 96.

Boonekamp of Maagbitter.—The following two formulas have been communicated to "Phar. Zeitung," 1881, No. 92:

1. Orange berries 100·0, orange peel 30·0, gentian 60·0, cascarilla 30·0, curcuma 15·0, cinnamon 25·0, cloves 15·0, rhubarb 7·5; alcohol (sp. gr. ·834) 750·0, and water 165·0 grams; digest, filter and add oil of staranise 40 drops, sugar 250·0 grams.

2. Orange peel 20, cascarilla and gentian of each 15·0, rhubarb and curcuma of each 10·0, alcohol 400·0, water 500·0, sugar 100·0 grams.

COMPOUND SOLUTION OF THE HYPOPHOSPHITES OF IRON, SODA, LIME AND MAGNESIA.

By Adam Gibson.

Read at a meeting of the North British Branch of the Pharmaceutical Society, January 11, 1882.

Within the last two or three years the hypophosphites have been gaining favor with medical men, and are gradually replacing the phosphates in the treatment of those cases where it is desired to introduce phosphorus into the system, either alone or in combination with iron and other bases. This is not surprising if we take into account the fact that phosphorus is held more loosely in the hypophosphites than in the phosphates, and that it might accordingly be expected that its assimilation by the various tissues requiring it would be much more readily effected from the former than from the latter.

The extreme solubility of the hypophosphites is another important point in their favor; all the alkaline and earthy salts of hypophosphorous acid being readily soluble in water, while the corresponding salts of phosphoric acid are nearly all insoluble in that menstruum, requiring the addition of a strong acid to effect solution. In fact doubts have been expressed as to whether the phosphates are assimilated in the system at all, or whether the benefit derived from their use does not depend upon the action of the bases alone.

For many years a preparation of hypophosphites has been before the profession, and latterly another preparation has been introduced from the other side of the Atlantic, but neither of these gives the proportionate amount of hypophosphites in solution, consequently prescribers are working in the dark, while both are very expensive preparations, and, therefore, not suitable for general use.

A much more satisfactory preparation than these is that recommended by Dr. Frederick Churchill, of the Victoria Hospital for Children, London. The formula of this preparation he published in an article communicated to the "British Medical Journal" for March 27, 1880.

Having been desired to make a quantity of this preparation and seeing the interest taken in the administration of hypophosphites at the present time, I have thought that the subject would not be an unsuitable one to bring before you for discussion.

It will be observed that the bases entering into the formula, which I shall now give you, are similar to those of Parrish's syrup, with the exception of the magnesium salt, the author of the formula substituting this for the potassium salt, owing to some objections which attend the administration of the latter:

	Grains in 100 minims.	Grs. in fl. ʒi.
Ferrous Hypophosphite ($FeOPH_2O_3+6H_2O$) .	2·77	1·6
Calcium Hypophosphite ($Ca_2PH_2O_2$) . .	3·5	2·
Sodium Hypophosphite ($NaPH_2O_2+H_2O$) .	3·5	2·
Magnesium Hypophosphite ($MgPH_2O_2+6H_2O$)	1·99	1·1
Hypophosphorous acid (H_3PO_2) . .	1·66	
Water	86·58	
	100·00	6·7 grs. mixed salts.

It will be observed that the formulæ for the ferrous, calcium and

magnesium hypophosphites are incorrectly stated, the correct formulæ for the salts being

$$Fe(PH_2O_2)_2+6H_2O,\ Ca(PH_2O_2)_2,\ Mg(PH_2O_2)_2+6H_2O.$$

This of course involves a great difference in the amount of hypophosphorous acid present in these salts, which in the case of the ferrous and magnesium salts is understated to the extent of one-half, and in the calcium salt to the extent of three-fourths.

With the view of securing the iron in a ferrous condition, double decomposition with ferrous sulphate and calcium hypophosphite was had recourse to (in preference to the uncertain method of saturating the hydrate, or the slow process of dissolving metallic iron in hypophosphorous acid), and having assured myself that this could be accomplished, the sodium and magnesium hypophosphites were made in the same way.

The only drawback to the preparation of the various hypophosphites from calcium hypophosphite, and the corresponding sulphates, is the formation of sulphuretted hydrogen in the solution, after it has stood for a little time. This result you may imagine would give considerable annoyance were its formation not obviated by the adoption of a proper method to ensure double decomposition between the sulphates and calcium hypophosphite, without the possibility of any bye-products, so to speak.

The sulphuretted hydrogen may arise in the following manner. It is well known that hypophosphorous acid acts as a powerful reducing agent, so that when brought into the presence of sulphuric acid (either pure or as sulphate) the sulphuric would be reduced to sulphurous and the hypophosphorous raised to phosphorous acid, thus,

$$HPH_2O_2+H_2SO_4=H_3PO_3+H_2SO_3.$$

Sulphurous acid again acting upon a fresh molecule of hypophosphorous acid would raise it to phosphorous acid with liberation of sulphur, thus,

$$2HPH_2O_2+H_2SO_3=2H_3PO_3+S+H_2O.$$

But this sulphur would not be found as such, for being in the presence of a reducing agent of so great power as hypophosphorous acid, the following action will in all likelihood ensue:

$$HPH_2O_2+S+H_2O=H_3PO_3+H_2S.$$

At all events, it is certain that sulphuretted hydrogen is formed in the solution under certain conditions, and I merely suggest these reactions as those which may probably take place.

In order to obviate these objectionable reactions, I have adopted the plan of dissolving all the salts in hot water, since if decomposition takes place in the cold it is prolonged, and may give rise to the above reactions; whereas by the employment of hot water the change ensues immediately, and thus contact between the acids is avoided.

It will be observed in the undernoted formula, that the hypophosphorous acid is stated as containing 30 per cent. HPH_2O_2; this has been found to be about the usual strength of the acid supplied by the wholesale houses.[1] The acid also usually contains traces of sulphuric acid, which slightly interferes with the finished product by precipitating a little lime as sulphate from the calcium hypophosphite added at the end of the process.

The working formula is as follows:

2 oz. 382 grs. $FeSO_4,7H_2O$+1 oz. 332 grs. $Ca(PH_2O_2)_2$=2·77 $Fe(PH_2O)_2,6H_2O$

5 oz. 364 grs. $Na_2SO_4,10H_2O$+3 oz. 35 grs. $Ca(PH_2O_2)_2$=3·5 $NaPH_2O_2,H_2O$

2 oz. 22 grs. $MgSO_4,7H_2O$+1 oz. 182 grs. $Ca(PH_2O_2)_2$=1·99 $Mg(PH_2O_2)_2$, $6H_2O$.

3 oz. 368 grs. $Ca(PH_2O_2)_2$=3·5 $Ca(PH_2O_2)_2$.

5½ fl. oz. HPH_2O_2, $70H_2O$=1·66 HPH_2O_2.

Method of Procedure.—Dissolve the whole of the calcium hypophosphite required to decompose the sulphates (6 ounces 112 grains) in 50 ounces of water; bring the solution nearly to boiling point, and acidify with half an ounce of the hypophosphorous acid; then stir in the ferrous, sodium and magnesium sulphates; double decomposition ensues almost immediately. After stirring two or three minutes, throw the whole on a paper filter, and wash the precipitate with hot water to 70 ounces.

Dissolve the 3 ounces 368 grains calcium hypophosphite in 25 ounces of water; filter, mix the filtrates, add to the solution the remaining 5 ounces of hypophosphorous acid, and make up with water to 100 ounces.

[1] The percentage was determined in the following manner: a known quantity of freshly calcined lead oxide was mixed with a known quantity of the commercial acid; to this a little nitric acid was added, and the whole evaporated and calcined; the weight of the product, after deducting the amount of PbO, gave the amount of acid present as P_2O_5, from which the amount of HPH_2O_2 was calculated.

Volumetric solution of soda gives a nearly similar result.

During a few days after its preparation it deposits a minute quantity of calcium sulphate, from which, however, it may wholly be freed by decantation or filtration.

This forms a clear and permanent solution; it may be mixed with simple syrup, claret and glycerin in any proportions, but the salts are gradually deposited from mixtures containing an appreciable percentage of alcohol.—*Pharm. Jour. and Trans.*, January 21, 1882.

IODINE-YIELDING ALGÆ—A PROPOSAL FOR THEIR MORE DIRECT USE IN PHARMACY.

By James Wheeler.

Read at an Evening Meeting of the Pharmaceutical Society, Feb. 1, 1882.

Some four years ago a London physician having described the topical employment of *Fucus vesiculosus* in the case of a patient living far inland, the writer was communicated with, and, by arrangement, undertook for a lengthened period the forwarding of the required supply of fresh fronds—the upper one-third being the part selected.

Since that time, circumstances having brought the writer to a part of the coast where algæ are to be seen in greater variety and luxuriance than he had ever before had experience of, he was led upon reflection to question why *Fucus vesiculosus* obtained, as a remedial agent, a monopoly of favor, both with the profession and with the general public.

Starting thereat with the assumption that the relative therapeutic value of the various algæ would be found to be in proportion to their contained iodine, and, furthermore, that this element might also be probably possessed by them in the ratio of their more or less total submergence at all states of the tide, he was, by mere curiosity, led to look up the literature of the subject in so far as his too slender library afforded the means. Sufficient to say that Muspratt's "Chemistry"—article, Iodine; Stillé and Maisch's "National Dispensatory"—articles, *Fucus vesiculosus* and *Chondrus crispus;* together with the manuals of materia medica and chemistry common to all pharmacies, failed to supply other than conflicting information concerning the percentages of iodine yielded by the various kelp-producing algæ. Indeed, it may, perhaps, be reasonably questioned whether, in the light of mod-

ern methods of iodine manufacture, the data afforded by analyses long since made upon the faulty system of open combustion, as the first step in the process, are to be considered as trustworthy indications of the amount contained in the fresh plants. Failing, therefore, to obtain the desired information from the published analyses at his command, he was led to make some simple experiments, which should indicate approximately the relative yield by some of the more ordinary species. Those selected for the purpose being (1) *Laminaria flexicaulis*, (2) *Laminaria saccharina*, (3) *Fucus vesiculosus*, (4) *Fucus nodosus*, (5) *Fucus serratus*, (6) *Rhodymenia palmata*, (7) *Chondrus crispus*, of each of which, sliced fresh fronds, in the proportion of 1 to 8 of water, with the exception of No. 7, were twice boiled, until the two decoctions when mixed, equaled one-half the water employed. These, when cold, were treated with starch paste, and at regular intervals successive minute quantities of chlorine, both noting the intensity of color produced and the amount of reagent required to discharge the colors. Iodine reactions were abundantly manifested by Nos. 1 and 2, and in much less degree by No. 4, all the others affording but negative results. Other decoctions were made, substituting dry fronds for fresh, with the result that No. 5 afforded faint signs of iodine.

Confirmatory testings were made with nitrous acid and bisulphide of carbon. This may be taken as the substance of repeated experiments, both with water and proof spirit as the menstruum. Of *Fucus vesiculosus*, however, it should be remarked that upon evaporating off the last remaining portion of the menstruum of a proof spirit tincture, the residue afforded some slight indications of the presence of iodine, and indeed, considering the universality of this element in sea water, readily evidenced when concentrated to about a seventh its bulk, it would be difficult to conceive a truly marine algæ failing to contain it in some minute proportion. Nor is its presence confined to plants; fishes, as is well known, especially the genus *Gadus*, affording an oil yielding traces of it. Oysters, likewise, have been proved to contain it. Sponge, also, by virtue of it as a constituent, afforded a remedy which, until Courtois' discovery, was deemed, to quote the words of an old writer, "an effectual cure for bronchocele and of infinite service in all scrophulous complaints." Even quite lately, burnt sponge has been prepared by some on the continent as proving less irritant than the preparations of iodine.

Whether upon consideration of the foregoing—which amounts simply to the long known fact of their being richest in iodine—the Laminariæ should, for medical employment, be preferred to *Fucus vesiculosus* and its congeners must of course be for the profession alone to determine. As pharmacists, however, we are already within our province in stating our grounds for the therapeutic investigation of new remedies. Of the direct employment of Laminariæ in this sense or even popularly in this country, I have been unable to obtain information. Dr. Royle, however, states that laminaria from the Euxine or Caspian Sea, or from the Persian Gulf, finds its ways to the foot of the Himalayas, where it is employed as a cure for goitre; also that in South America the stems are sold by the name of goitre sticks, because they are chewed by the inhabitants where goitre is prevalent. Now it may be here remarked that the mere consideration of these, perhaps, *primâ facie* grounds for therapeutical inquiry, would have been deemed by the writer wholly insufficient to have warranted his claiming the attention of this meeting had not he, whilst separating the iodine from a decoction of *Laminaria saccharina*, been impressed with the probability, and after trial, assurance of the capability of the decoction of the latter to emulsify cod liver oil both easily and perfectly, and, thus far, with so much promise of therapeutical fitness for the purpose as to well nigh warrant the belief that a long felt desideratum had by it been obtained.

Thr following notes and formulæ embody the results of the writer's investigations:

Laminaria Cloustoni.—The fronds of this yield a decoction rich in iodine, though perhaps in somewhat less measure than *L. flexicaulis.* The writer is unable to suggest any particular employment for which it should be preferred to the other members of the genus. From the facility, however, with which its fronds are powdered, it would afford a cheap and possibly useful compound of a resolvent poultice or, on paper after the manner of charta sinapis or some more flexible material after the fashion of the popular porous plasters, supply on soaking in water a convenient application to scrofulous joints, etc.

Laminaria flexicaulis.—This doubtless is the richest of all algæ in iodine, which it yields from the fronds in larger percentage than either the stem or root. Maceration with water or proof spirit is found to extract its iodides. Seawater, also, whether of normal density or con-

centrated down to 5 volumes in 1, serves equally as a menstruum and offers, in addition to its possibly enhanced therapeutic quality, the property of keeping well. It is possible the profession may one day find a varied employment for the presumably useful therapeutic properties of this species.

The writer would suggest the following formulæ for its employment:

Infusion of Laminaria flexicaulis.

Take of dried and sliced fronds,	1 part.
Water,	10 parts.

Macerate with occasional stirring for four hours and strain with pressure.

Tincture of Lamarinia flexicaulis.

Take of dried and sliced fronds,	1 part.
Proof spirit,	8 parts.

Laminaria saccharina is of a more complex character than either of the preceding, yielding to decoction 50 per cent. of its weight and affording iodine, bromine, and mannite, the latter shown by Stenhouse to amount to 12 or 15 per cent. of the plant, and a mucilage which in the experience of the writer differs materially from that afforded by any other species. Its emulsifying power has already been alluded to. *Chondrus crispus* will, by virtue of its glutinous quality, give a pseudo-emulsion with cod liver oil, differing optically, however, from the more minute division and permament separation of the oil particles effected by *Laminaria saccharina*. It moreover fails in keeping quality and obviously lacks the therapeutic credentials of the above.

The writer apprehends that the chief use of this species will lie in the preparation of cod liver oil emulsion, for which purpose he submits the following formulæ with confidence:

Decoction of Laminaria saccharina.

Take of dried and sliced fronds,	1 part.
Water,	10 parts.

Macerate for four hours with occasional stirring, then heat gradually to boiling, which continue until its viscosity is discharged.

By evaporation it can be reduced to the consistence of an extract or so dried as to yield a horny translucent mass, in either of which conditions, however, it has not the emulsifying power of an equivalent of fresh decoction. The following is the writer's formula:

Cod Liver Oil Emulsion.

Take of cod liver oil, ...	10 parts.
Glycerin, ...	1 part.
Cold decoction of Lam. sacch., . . .	9 parts.

Put into a bottle of suitable size and mix by agitation. To the liquid may be added some small proportion of essential oil, for which purpose the writer is accustomed to employ oil of eucalyptus. This emulsion has been subjected to some crucial tests and is found to keep well; also it may be said that by those who have taken it, it is deemed "nice" in flavor rather than disagreeable. It obviously presents the oil in a condition easy of amalgamation with the contained food in the stomach and thus may doubtless favor its more ready digestion and ultimate assimilation.

Tne only medical opinion as yet obtained is from Dr. Slade King, of this town, who was, at my instance, the first to employ it and who reports favorably of its properties.

It may be added that it is now undergoing trial in hospital at the hands of Professor Fraser, so that probably some exact information respecting its therapeutic value will soon be forthcoming.

The writer had purposed including the results of some comparative experiments made with various antifermentatives in decoction of *Lam. saccharina*, but the length he has already trespassed forbids him more than stating that at present, after six weeks' trial, the only perfectly successful results have attended the use of—

Salicylic acid, ...	½ gr. to ʒi.
Cinnamic acid, ...	½ gr. to ʒi.
Chloroform, ...	2 drops to ʒi.
Glycerin, with	5 per cent.
Oil of eucalyptus, ...	½ per cent.

whilst failure followed the use of boracic acid 2 gr. to ʒi, glycerinum boracis 15♏. to ʒi, glycerin ½ dm. to ʒi, borax 2 gr. to ʒi, oil of eucalyptus 2 drops to ʒi, lupulin 2 grs. to ʒi.

It will be sufficiently obvious that carefully selected living plants, after proper drying, are alone fitted for the preparation of these formulæ.

In conclusion, the writer would express his deep obligation to Mr. Holmes for the interest shown and kindness received from him in matters relevant to this paper.—*Ilfracombe, Phar. Jour. and Trans.*, Feb. 4, 1882.

SYRUPUS FERRI PROTOCHLORIDI.

Editor Amer. Journal of Pharmacy:

The fact of sugar reducing the ferric to ferrous chloride in the rays of the sun induced me to prepare a syrup of protochloride of iron, which in every respect is superior and preferable to the tincture of chloride of iron and which, if adopted into the U. S. Pharmacopœia, will no doubt in most cases take the place of the tincture, being agreeable to taste, not corroding or blackening teeth, and more easily assimilated by the blood.

The following is the formula adopted by me:

℞	Liq. ferri perchloridi, U. S. P., . . .		f℥v½ ♏xx
	Glycerini, ...		℥iv
	Syr. simpl., q. s. ad		Oi
	Olei rosæ, olei neroli, ...	*aa*	gtti

Mix and expose to the sun until entirely colorless.

Three or four days will be sufficient in summer, six to eight in very cold weather, the coldest weather not being an impediment for the reduction, which can be promoted by heating the syrup near the stove before exposing it to the sun.

In iron strength 1 fluidrachm of this syrup is equal to 10 minims of tinctura ferri chloridi.

This syrup has become quite a favorite with several physicians in this place, being especially suitable for children, and I think it deserves to be regarded as one of the most agreeable and active iron preparations. It can be mixed without change of color or decomposition with elixir of calisaya bark, tincture gentian, the syrup and elixir of hypophosphites, solution of bromides, etc.

In diffused daylight it will acquire a brownish color without changing its qualities; a separation of grape sugar has not been noticed, on keeping.

ALFRED FRÜH.

Greenville, N. J., Feb. 9.

NOTE.—Syrup of ferrous chloride is made in France by dissolving 5 grams of dry ferrous chloride in 20 grams of orange flower water and adding 800 grams of simple syrup and 175 grams of syrup of orange flower. See this journal, 1877, p. 349. EDITOR.

POISONING WITH OIL OF RANUNCULUS, ANEMONIN AND CARDOL.

By Alfred Basiner.

From a pamphlet, entitled: Die Vergiftung mit Ranunkelöl, Anemonin und Cardol in Beziehung zu der Cantharidin Vergiftung. Dorpat, 1881.

Experiments made with the fresh herb of Ranunculus sceleratus yielded the oil as a light yellow neutral liquid on agitating the aqueous distillate with ether and evaporating the solvent. The results obtained by the author are summarized as follows:

1. Oil of ranunculus may be separated from the aqueous distillate, acidulated with acetic acid by agitation with ether or benzol; the oil cannot be obtained after the aqueous distillate has been rendered alkaline by potassa.

2. The oil may likewise be obtained by treating the fresh plant with glacial acetic acid and agitating with benzol. Thus prepared it is not chemically pure, but has the advantage of remaining unaltered for a longer time than the distilled oil, which is readily converted into anemonin and anemonic acid.

3. If the fresh herb is treated with potassa instead of with acetic acid, the oil is decomposed.

4. The oil of ranunculus cannot, therefore, be isolated by Radecki's method for cantharidin (treatment with potassa, etc.), and cannot be mistaken for the latter.

5. In warm-blooded animals the oil of ranunculus acts as an acrid narcotic, producing, in small doses, stupor and slow respiration, in larger doses also paralysis of the posterior and anterior extremities, and before death convulsions of the entire body. The acrid action is shown by a corrosive gastritis and by hyperæmia of the kidneys, more particularly in the cortical substance. The presence of the oil in the vomited matter could be proven by extraction with glacial acetic acid and agitation with benzol. The examination of the urine and various organs of the poisoned animal, which was performed once, had a negative result.

From the experiments with anemonin the following results were obtained:

1. The rubefacient action of anemonin is very variable, not only in different individuals, but applied on the same person it may produce

redness of the skin, with subsequent vesication, at another time merely redden the skin, or be without any effect.

2. Anemonin may be isolated from acid solutions by agitation with benzol, but not from an alkaline solution.

3. Therefore anemonin cannot, by Radecki's process, be mistaken for cantharidin.

4. Notwithstanding its insolubility in water, anemonin is absorbed from the stomach as well as from the subcuticular tissue; it acts as a narcotic, lessening the respiration and, according to Clarus, also the pulse, and producing stupor, coma and paralysis of the extremities. Death is produced without convulsions, probably by paralysis of the heart and lungs. It has no irritating action upon the stomach, intestines and kidneys. The autopsy shows congestion of the right heart and large veins, and, according to Clarus, the membranes of the brain are hyperæmic.

5. After poisoning by anemonin, the presence of this compound is best proven in the contents of the stomach, in the small intestines, and particularly in the urine. The chemical reactions of this poison are uncertain, and may be supplemented by the physiological action on small frogs, but even this is of limited importance.

6. The excretion of anemonin, like that of cantharidin, appears to take place mainly through the kidneys.

For the experiments with cardol the etherial extracts of the pericarp of both the West Indian and East Indian cashew nuts were applied. 0·09 gram of the former applied to the breast upon a piece of lint 1 centimeter square in 14 hours raised a blister, with watery contents, changing within a day to a pus-like liquid, and healing after forming a scab. 0·11 gram of the brown-black oil of the oriental cashew nut applied as before raised within 12 hours a black blister; on the following day eczematous vesicles appeared on the breast and extended during the following four days gradually to the armpit, abdomen, penis, face, hands and forearm. The treatment consisted in evacuating the bowels, applications of lead-water to the eyes and of carbolic oil to the eruption; chloral hydrate and morphine were given. On the sixth day scabs began to form on the breast and forehead; micturition painful, urine red-brown: stools bloody, very painful. On the eighth day micturition and stools painless. On the ninth day, September 6, scabs began to form in the face. The desquamation of all affected parts was

completed September 16, with the exception of the hands, which required another week.

On searching for a chemical reaction of cardol it was observed that the brown oil of oriental cashew nuts produced with aqueous and more intensely with alcoholic solution of potassa a green color, and that the alcoholic solution turned black with basic acetate of lead. The brown oil from the West Indian cashew nut dissolves in potassa with a pale red color, which gradually becomes darker on exposure to the air; alcoholic potassa yields a yellowish-red color, darkening on exposure; after boiling and pouring the liquid in a watch crystal, a violet red color is observed, gradually turning more red; the alcoholic solution of this cardol yields with basic lead acetate a pale red precipitate, gradually becoming darker; acetate of copper yields a grass-green precipitate. Anemonin shows a very similar behavior to that described for cardol by boiling with alcoholic potassa, but it has none of the other reactions.

The results of the author with cardol are summarized as follows:

1. Cardol from West Indian cashew-nuts differs chemically from that of oriental cashew-nuts; the action of the latter, on being applied to the skin, seems to be more extended and more intense.

2. Cardol may be separated from mixtures by extraction with glacial acetic acid and subsequent agitation with benzol.

3. Cardol is decomposed by potassa, and cannot therefore be isolated by Radecki's method for cantharidin.

4. On subcutaneous injection of small doses, cardol produces in cold-blooded animals paresis, increasing to paralysis, of the extremities, stupor, paralysis of respiration, and previous to death tetanic spasms.

5. Large doses of cardol, swallowed by warm-blooded animals, have no lethal effect; but a resorption takes place evincing its chief action upon the spine and brain, producing stupor and paralysis of the extremities, also a violent diarrhœa. On dissection an intense inflammation is observed, combined with hemorrhages of the mucous membrane of the small and large intestines; also a slight hyperæmia of the kidneys.

6. The excretion of cardol appears to take place to a small extent through the feces, and mostly through the urine, in which the presence of the poison is best established. The chemical reactions may be supplemented by the physiological effects on small frogs.

Comparing the results obtained with oil of ranunculus, anemonin and cardol, the following may be deduced:

1. The three bodies may be isolated by extraction with glacial acetic acid and agitating with benzol.

2. Although cantharidin may be isolated in the same manner, it cannot be confounded with the former three bodies, since it may likewise be obtained by means of caustic potassa, which decomposes the other three bodies.

3. Oil of ranunculus and cardol are powerful and sure vesicants, while the vesicating action of anemonin is uncertain.

4. Anemonin taken internally acts as a narcotic, the other two as acrid narcotics; the narcotic action is directed upon brain and spine. The corrosive action of oil of ranunculus takes place in the stomach, but that of cardol in the lower part of the small and in the large intestines.

The author has also examined the tincture and herb of *arnica* for the presence of a vesicating principle, which Wilms (1873) stated to exist therein; but he was unable to obtain such a principle, and his results were verified by experiments performed by Kessler.

GLEANINGS IN MATERIA MEDICA.

By the Editor.

Digitalis Leaves.—Some authorities require an infusion of digitalis in the proportion of 1:100 to yield at once a strong turbidity with tannin, and after 15 minutes a turbidity with ferridcyanide of potassium. However collected in mountainous regions during the flowering period the leaves gave only slight reactions, but responded promptly to those reagents in infusions of the strength 1:10.—*Pharm. Ztg.*, 1881, No. 99; *Ph. Tidskr.*, Nov. 21.

Adulteration of Saffron.—C. Bernbeck reports having met with saffron adulterated with carthamus, and in another case an adulteration with the petals of red poppy which had evidently been cut into pieces of a uniform shape by means of a special apparatus; the infusion turned gray-green with ammonia, and became of a brighter red with nitric acid. The behavior in the spectroscope was the more characteristic, the left side of the scale being completely extinguished with gradual dimunition to D, red and orange being but slightly absorbed.—*Pharm. Ztg.*, 1881, No. 98.

Adulterated Manna was observed by A. Jandous; a common manna gerace was mixed with fragments of white grape sugar, whereby the appearance of the soft sticky mass was improved. The adulteration was made plainly evident only after crushing the manna.—*Pharm. Post*, 1881, No. 24.

New Drugs from the Argentine Republic. The following are mentioned by Gehe & Co.:

Cestrum pseudoguina, Mart., durazuillo, nat. ord. Solanaceæ. The leaves and rootbark are employed in fevers and abdominal complaints.

Nierembergia oippomanica, Mart., chucu, nat. ord. Solanaceæ. Horses feeding on it are attacked by fever and rigor, called "chucu."

Xanthoxylum Coco, Gill., Rutaceæ; used against chucu.

Gourliea Decorticans, Gill., chanar, Leguminosæ; the inspissated juice of the fruit is used in pectoral complaints; the bark in difficult after-birth.

Zizyphus Mistol, Griseb., Rhamnaceæ; the fruit is diuretic.

Condalia lineata, Griseb., piquillin, Rhamnaceæ; the inspissated juice is laxative; chiefly used for children.

Celtis Tala, Gill., Urticaciæ; an infusion of the leaves is used in pectoral catarrhs.

Martinia montevidensis, Cham., Gesneraceæ; the seeds are used in diseases of the eye.

Prosopis Tintitaco, Leguminosæ; the fruit is diuretic.

Colletia ferox, Gill., s. Barba tigris, Rhamnaceæ; the wood is very hard and indestructible, even in water.

Topas aire, Compositæ; botanical name not known; used in ophthalmic complaints.

Nio, probably identical with *mio-mio* from Baccharis cordifolia *Lam.*, Compositæ; the herb is a deadly poison to cattle and, according to P. N. Arata, contains an alkaloid, *baccarine.—Zeitschr. Oest. Apoth. Ver.*, 1881, No. 27.

Jacaranda procera, Sprengel, s. Bignonia Copaia, *Aubl.*, s. Kordelestris syphilitica *Arruel* s. Bignonia Càroba, *Vellos.* This handsome little tree is known in Brazil as caroba, carobinha, caroba miuda, and caroba mirim, and grows frequently in the provinces of Rio de Janeiro, Minas and Espirito Santo. Th. Peckolt has examined both the leaves and bark with the following results, obtained from 1,000 grams:

	Leaves.	Bark.
Carobin, crystallized,	1·620	3·000
Carobic acid, crystallized,	·516	.....
Steocarobic acid, crystallized,	1·000	.....
Carobone, balsamic resinous acid,	26·666	.....
Carobaretic acid, inodorous,	.....	2·000
Carobaresin, inodorous, tasteless,	33·334	5·000
Caroba balsam,	14·420	.....
Bitter principle,	2·880	2·830
Extractive,	10·550	19·530
Extractive and organic acids,	10·000	.....
Caroba tannin,	4·390	4·800
Glucose,	.....	1·650
Chlorophyll and wax,	9·000	.....
Calcium malate,	·200	76·100
Albumen, starch, dextrin, salts,	32·120	
Cellulose and moisture,	853·304	885·090

Carobin crystallizes in feltlike silky needles, is inodorous, has a faint alkaline and bitterish taste, infusible, insoluble in ether, readily soluble in boiling water and boiling alcohol and is precipitated by tartar emetic and ammonium carbonate, the latter precipitate being soluble in an excess of the reagent. Tannin and metallic chlorides and iodides cause no precipitate. It is not a glucoside, does not show any striking color reactions and yields with acetic acid a compound crystallizing in fine needles.

Carobic acid forms stellate fusible needles of an aromatic odor and acid taste, is soluble in water and dilute alcohol and is precipitated by the acetates of lead and copper.

Steocarobic acid is pale-brown, of a tonka-like odor, of an acid and balsamic taste, and soluble in cold absolute alcohol and ether.

Carobone is greenish, amorphous, aromatic, soluble in alcohol, sp. gr. ·815, in caustic alkalies and in boiling solution of sodium carbonate.

Caroba balsam is dark-brown, syrupy, agreeably aromatic, resembling tonka and by heat may be evaporated to a nearly inodorous resin.

Caroba leaves have lanceolate, often sub-obovate leaflets and are used in Brazil in place of sarsaparilla, in cutaneous affections and as an antisyphilitic, usually in the form of infusion, 120 grams to 1 liter, in doses of a teaspoonful three times daily. An *electuary* known as "massa de Dr. Alves Carneiro" is composed of the powders of caroba leaves 90 grams, sarsaparilla and senna each 30 grams, calomel 2 grams and simple syrup q. s., and is given in cuta-

neous syphilitic affections in doses of a teaspoonful morning and evening, together with caroba tea.

The above analysis was completed in 1866; a manuscript in French sent to the Paris exposition was never published; but a catalogue was published by the author in Ria in the Portuguese language in 1868. An analysis credited to C.W. Zaremba in "Phar. Centralhalle" June 23, 1881, gives figures identical with the above.

The following plants are also known in Brazil as caroba:

Jacaranda subrhombea, D. C., s. Bignonia obovata, *Vellos.*, caroba preta or carob-assú; a furrowed crisp dark-green leaf, not aromatic, apparently less efficacious.

Bignonia nodosa, Manso, caroba do campo, slightly aromatic, grows in the prairies, esteemed to be equal to true caroba.

Jacaranda oxyphylla, Cham., s. Big. antisyphilitica, *Martius*, caroba des paulistas; leaflets dark-green, nearly inodorous, reputed to be also laxative; grows in the province of San Paulo.

Bignonia purgans, caroba guyra, in Amazonas; leaves used as an antisyphilitic, the root-bark as a purgative.

Sparattosperma lithontripticum, Mart., caroba branca; leaves light-green, mealy, aromatic, acrid and bitter; diuretic.

Cybistax antisyphilitica, Mart., s. Big. quinquefolia, *Vellos.*; used in dysury, dropsy, chronic liver complaints, syphilitic ulcers, etc.—*Zeitschr. Oest. Apoth. Ver.*, 1881, No. 30, 31.

Volatile Oil of Likari Kanali, or Female Rosewood—H. Morin gives a brief description of this volatile oil, recently imported from French Guiana, and known in commerce as "essence de linaloes." While this product is obtained from the above-mentioned source, or the so-called white cedar tree (cedre blanc de Cayenne), and is assigned to an *Acrodiclidium* of the natural order Lauraceæ; the linaloes wood of Mexico, which also yields a very fragrant volatile oil, is obtained, according to Collins,[1] from *Elaphrium graveolens*, Kunth, natural order Burseraceæ. The first-mentioned oil is nearly colorless, lighter than water, and has an agreeable aromatic odor, resembling that of roses and lemons; it burns with a sooty flame, does not solidify at 20°C., but becomes thereby turbid from the presence of a small amount of water, and deposits fine needle-shaped crystals. When deprived of water by means of chloride of calcium, it distils almost entirely at a constant

[1] Flückiger. "Pharmakognosie des Pflanzenreiches," II Auflage, p. 196.

temperature, and forms then a perfectly colorless liquid of the sp. gr. 0·868, which boils at 198°C., rotates 19° to the left, and is soluble in alcohol, ether, and glycerin. Caustic potassa has no action upon the oil; bromine, iodine, and nitric acid, however, produce a violent reaction, accompanied in the first instance with the evolution of vapors of hydrobromic acid. Hydrochloric acid gas is absorbed by the oil, forming a liquid compound with a comphoraceous odor; concentrated sulphuric acid mixes with it with the development of heat, and produces a brown, smeary mass. Its elementary composition corresponds to the formula of Borneo camphor, $C_{10}H_{18}O$; by treatment with chloride of zinc it yields a neutral, viscid hydrocarbon, having the odor of turpentine and the composition $C_{10}H_{16}$.—*Jour. der Pharm. et de Chim.*, July, 1881, p. 66.

VARIETIES.

EFFECT OF DRUGS ON LACTATION.—The practical conclusions of Dolan and Wood, in "Practitioner," are: 1. Therapeutical agents intended to act on the mammary gland must first enter the blood. 2. Drugs derived from the natural orders Liliaceæ, Cruciferæ, Solanaceæ, Umbelliferæ, etc., enter the blood and impregnate the milk, hence caution is needed in giving such drugs to nursing women. 3. The only approach to a true galactagogue is jaborandi. 4. Belladonna is an antigalactagogue. 5. In inaction of the mammæ the milk may be increased and influenced by medicines. 6. The milk may be increased in heat-forming elements by administration of fats. 7. The salts of milk are improved by administration of medicines. 8. Various physiological actions—purgative, alterative, diuretic, etc.,—are produced in the child by giving drugs to the mother. 9. We must look to diet for improvement in milk-secreting power, both as to the quantity and quality of the milk.—*Louisville Medical News.*

A NEW PURGATIVE.—The "Concours Médical" reports that Dr. Rabuteau has experimented with sulpho-phenate and sulpho-cresylate of sodium, and has obtained excellent purgative effects with both. A dose of from 20 to 25 grams (℥v to vj, gr. xv) will induce seven or eight stools in the course of a day. Those salts are eliminated, almost totally, without any change, and their use is advised in cases of fetid diarrhœa.—*Med. and Surg. Rep.*, February 11.

COTTONSEED AND OLIVE OIL MIXTURES.—G. A. Buchheister procured a sample of pure cotton oil to experiment upon. The result of investigation was, after finding that the ordinary tests, sulphuric and nitric acids, potash-lye, ammonia, etc., produced no characteristic reactions, a simple

process by which an addition of 10 per cent. is visible, and one of 20 per cent. quite distinct (smaller proportions are not often used), if comparative tests are made on pure olive oil. He operated in a somewhat similar manner, according to Boudet's principle, with a mixture of equal parts of sulphuric and nitric acids. If three parts of this mixture, after being allowed to cool, are added to ten parts of the oil, and the whole is well shaken together, pure olive oil has a white color with a greenish cast, oil of sesame a grass green, and cotton oil a paler color. After a few minutes the liquids separate, and pure olive oil appears almost unchanged, cotton oil a light brown, and rape oil a lighter and more reddish brown. If a sample of oil therefore turns brown with the above test, we have either cotton oil or a cruciferous oil (rape or colza). The presence of the latter may then be easily ascertained by means of oxide of lead, which they blacken.—*Droguisten Zeitung; Oil and Drug News.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, Feb. 21st, 1882.

In absence of the President, Mr. A. Robbins was called to the chair.

The minutes of the last pharmaceutical meeting were read and approved.

The introduction of strangers being the first business, Mr. Louis Dohme, of the Maryland College of Pharmacy, who was present, was invited to participate in the meeting.

Prof. Sadtler exhibited and operated with the new *electrical apparatus* presented by our fellow member and graduate, Mr. F. Gutekunst, with *Geissler tubes* of various patterns, which gave illustrations of extreme beauty. A vote of thanks of the College was tendered to the donor for the great interest he has shown in furthering the educational advantages of the College.

Prof. Remington exhibited a piece of apparatus combining a *plaster-spreading apparatus* with graduated plates for making plasters of any definite size, and arranged so that it could be used as a *lozenge board*, and, by the addition of a grooved plate, as a *pill machine*. An illustrated description of the apparatus will appear in the April number of this journal. The apparatus was designed by Mr. W. C. Franciscus, of the present junior class.

A note upon *hypophosphorous acid*, by G. M. Beringer, Ph.G. (see page 100), was read by Prof. Maisch, and referred to the Publishing Committee. Prof. Maisch said that he believed the hypophosphites of the alkalies to have an alkaline reaction, and that neutralization was not the most exact method of estimating the acid. Prof. Power stated that an exact method consisted in oxidizing by potassium permanganate. Mr. Bullock preferred neutralization with a carbonate as the most suitable process for the pharmacist.

A formula for *mistura apii composita* was read by Prof. Maisch, who received it upon inquiry from Dr. W. A. Hammond, by whom an extem-

poraneous prescription, consisting of two parts fluid extract of coca, one part fluid extract of viburnum, and one part of fluid extract of Apium graveolens, is thus designated for convenience. The mixture is an excellent nerve sedative and tonic, and is given in doses of from one to two teaspoonfuls three times a day.

Inquiry was made respecting *fluoride of sodium* and *fluoride of potassium*, which have been recommended in boulimia—a morbid desire for food—without giving the dose. Dr. L. Wolff stated that he had prepared the salts by neutralizing hydrofluoric acid with the carbonate of either base desired; the process should be conducted either in lead or platinum vessels.

A paper upon the *solubility of sulphate of morphia* was read by Professor Power, and was referred to the Publishing Committee (see page 97). This paper elicited some comment, several members present stating that they had noticed a difference in the solubility of the salt as obtained from different manufacturers.

Prof. Power also exhibited a *Geissler's vaporimeter*, which is an apparatus for testing the alcoholic strength of various liquids, and is operated by the pressure of alcoholic vapor, at the temperature of the water-bath, upon mercury which is thereby forced into a capillary tube connected with a graduated scale from which the percentage by volume and by weight is read off. Experimenting with *Hercules Malt Wine*, after depriving it of carbonic acid by lime, the vaporimeter showed it to contain 7·39 per cent. by volume, or 5·86 per cent. by weight, of alcohol. This malt wine is a deep red-brown beer-like liquid, resembling in some respects certain commercial so-called extracts of malt, but differing greatly from the unfermented *extractum malti* of the German Pharmacopœia, and prepared by pharmacists.

There being no further business, on motion, the meeting adjourned.

T. S. Wiegand, *Registrar*.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

Connecticut Pharmaceutical Association. — The sixth annual meeting was held in St. George's Hall, Bridgeport, on Feb. 7th and 8th, President L. I. Munson in the chair. Reports were read from the various officers and committees, the Treasurer reporting a balance on hand of $746.29, and the Committee on Legislation stating that some amendments to the pharmacy law are under consideration. The President, in his annual address, gave an account of the operations of the association through its officers during the past year, and made several suggestions which were acted upon.

An invitation from Mr. P. T. Barnum to visit the winter quarters of his menagerie and see the baby elephant was received and accepted.

The election of officers resulted as follows, Mr. Munson declining to serve a second term: President, Dwight Phelps, of West Winsted; Vice

Presidents, N. D. Sevin, of Norwich, and Walter R. Francis, of New Haven; Secretary, Frederic Wilcox, of Waterbury; Treasurer, George P. Chandler, of Hartford.

After several amendments to the constitution and by-laws had been acted upon, the historian of the association, Mr. Julius G. Rathbun, of Hartford, read his report, which was full of wit and humor. The gentleman was reappointed to the position for another year.

During the meeting eight papers on spirit of nitre, officinal fluid extracts, tinctures, glucose in sugar, tincture of opium, compound tincture of cardamom, soluble extract of licorice and on standard formulas for unofficinal preparations were read, a number of committees were appointed, and after passing votes of thanks the association adjourned to meet next year in Hartford, Mr. E. C. Frisbie being chosen Local Secretary.

A very creditable exhibit of drugs, preparations, glassware and sundries was made by 8 or 10 firms.

Massachusetts College of Pharmacy. — At the pharmaceutical meeting held Jan. 10, Mr. F. A. Davidson read a paper on *stearin and stearic acid*, by-products from the manufacture of lard oil and glycerin, which are at present mainly used in the manufacture of soap and a few mechanical applications, and which may serve the purpose of a cheap and useful base for ointments, especially those dispensed for veterinary use.

Allusion was made to the use of fresh sweet lard made from the "leaves," to the emollient properties of mutton tallow in domestic use, and to the fact that paraffin products are not as readily absorbed by the skin as fats.

Mr. G. F. Dinsmore exhibited a *plaster machine*, for spreading plasters of any desired size.

Attention was also directed to the recent extensive and valuable additions to the College library.

The Ontario College of Pharmacy has had under consideration for some time the expediency of establishing a teaching college, the subject having been referred to a committee, which reported to the Council on Feb. 2d, recommending the appointment of a permanent Educational Committee and of a staff of lecturers. The recommendations were adopted, a sum of money was appropriated to defray the necessary expenses, and the following teachers were appointed: E. B. Shuttleworth, Professor of Chemistry and Pharmacy; H. J. Rose, Professor of Materia Medica, and W. S. Robinson, Demonstrator in Practical Dispensing and Prescriptions. The chair of botany has not yet been filled.

With commendable promptness, a course of lectures will be delivered during the spring.

California Pharmaceutical Society.—The regular quarterly meeting was held Jan. 12th, in the Academy of Science building. The trustees reported that during the past year 47 students had matriculated, and

that out of 14 candidates for the degree of Graduate in Pharmacy the following 13 passed: J. J. Argente, A. L. Scholl, D. Lustig, M. J. Murphy, W. H. Adair, C. P. Elwert, C. M. Troppman, H. Cody, D. Fletcher, Chas. Hammit, J. M. Dewitt, J. P. Fevrier and Geo. Chard.

Prof. Emlen Painter, the President, in his annual address related the purchase of a lot by the Board of Trustees, situated on Fulton street, west of Polk, size 30 by 97 feet, at a cost of $2,700. The address also recommended the immediate establishment of a building fund for the permanent improvement of the ground and the accommodation of the College.

The report by the Treasurer, Wm. J. Bryan, showed a balance in hand of $1,434.56

The several other officers handed in their reports; there are now 85 active members on the roll.

Mr. John Calvert gave notice that he would offer a resolution at the next meeting that the funds of the California Pharmaceutical Society and the College of Pharmacy be consolidated.

The following officers were elected for the ensuing year: President, Emlen Painter; Vice Presidents—Wm. M. Searby, James Topley; Corresponding and Recording Secretary, Fred. Grazer; Treasurer, Wm. J. Bryan; Librarian and Curator, Ph. L. Vreeland; Editor, William M. Searby; Board of Trustees—Emlen Painter, John Calvert, John Dawson, D. W. Kirkland, S. A. McDonnell, Fred. Keil, F. A. Grazer.

Mr. S. A. McDonnell read a very interesting paper on quillain, or Extractum Quillaiæ Exsiccatum, its uses, and advantages for preparing instantaneously emulsions of fixed oils, etc.

Pharmaceutical Society of Great Britain.—At the Pharmaceutical meeting held December 7th, Mr. J. B. Barnes read a paper on *the antiseptic properties of cinnamic acid.* The solubility of cinnamic acid is given as follows: lard 3·0 per cent., cacao butter 0·5, expressed oil of almond 1·0, codliver oil 2·0, white wax 3·0, paraffin 0·5, oleic acid 5·0, benzol 1·0, ether 20·0, chloroform 8·0, glycerite of borax 1·5 and water $\frac{1}{10}$ per cent., one part of the acid dissolves in olive oil 66 parts, vaselin 40 parts, spermaceti 66 parts, 2 per cent. watery solution of sodium phosphate 50 parts, 2 per cent. borax solution 25 parts and in glycerin 400 parts.

Two grains of cinnamic acid were added to 4 fluidounces of the following liquids with the results indicated: Albumen solution, became putrid on the eighteenth day; gelatin solution, putrid on the fifteenth day; urine, cloudy on the twenty-ninth and putrid on the thirty-first day; decoction of malt, fermentation retarded; cold infusion of malt broke down on the thirty-sixth day; infusion of roses unchanged after sixty days. The experiments were made at 60°F. Four grains of cinnamic acid preserved the liquids for a longer period.

In the discussion on this paper, Mr. Ekin said that in some experiments made by him on *milk* some years ago, he had found *boracic acid* to be decidedly superior to salicylic or benzoic acid, that it was harmless and tasteless, and that he believed it was now used by hundredweights in the north of England for the preservation of milk.

Mr. Symes had not been encouraged with the use of cinnamic acid prepared from tolu balsam as an antiseptic agent, and agreed with the views expressed by Prof. Attfield, that each of the different antiseptics would probably be found to be best adapted for one class of substances, instead of for all.

In experimenting with *juice of meat*, Mr. Gerrard had found *chloroform* to be the best antiseptic, while the preparation containing boracic acid was the first one to break down. Meat juice containing ¼ per cent. of chloroform was still intact after three months.

A paper by Mr. W. A. H. Naylor was read, giving the results of the proximate analysis of *the fruit of Omphalocarpum procera*, which was found to contain 1, a congener of gutta; 2, a resin allied to fluavil; 3, a glucoside analogous to saponin, but approaching more nearly to monesin; 4, a vegetable wax; 5, a neutral crystalline principle, omphalocarpin, soluble in alcohol, less soluble in water, and very slightly soluble in chloroform and ether; gives with warm sulphuric acid a rich purplish-crimson color; 6, a bitter and coloring principle, resembling cinchona red in appearance, and insoluble in chloroform, ether and water; 7, glucose; 8, an organic acid; 9, a fixed oil; 10, gummy and albuminous matter and 2·5 per cent. of ash. The plant had been placed by some botanists in the order of Ternstrœmiaceæ, by others with the Sapotaceæ; the evidence from the chemical properties clearly preponderates in favor of the latter.

At the meeting of the North British Branch, held December 1st, Mr. Wm. Gilmour read a paper on *the formation of cream of tartar in Seidlitz powder*, showing that acid potassium tartrate is formed in larger quantity than the excess of tartaric acid would theoretically indicate, and that this is due to the influence of carbonic acid. Using 120 grains of Rochelle salt, 40 grains of sodium bicarbonate and 40 grains of tartaric acid, or of the latter an excess of 4½ grains, not 6, but 15 grains of cream of tartar were precipitated; using 45 grains of acid or 9½ grains in excess, the precipitate weighed 30 grains. On putting the ingredients of the Seidlitz powder into a soda-water bottle with 6 ounces of water and with 30 grains of tartaric acid, that is 5½ grains below the neutralizing quantity, a copious precipitate will be formed, which will not be redissolved with frequent agitation for several hours.

Gregory's Powder, *Pulv. rhei comp.*, had been experimented with by Mr. Gilmour, who observed that magnesium carbonate, when mixed with calcined magnesia, did not make a miscible Gregory's powder, but that if the rhubarb and ginger were first thoroughly triturated with about 5 per cent. of the carbonate, and the calcined magnesia afterwards added, there resulted a beautiful and quickly miscible powder.

Mr. Nesbit had found in powdered rhubarb 4 per cent. of an oil of sp. gr. ·91 which had been used for facing the rhubarb, and greatly affected its miscibility with water.

A series of experiments were detailed by Dr. Inglis Clark, from which it was concluded 1, that the non-miscibility is promoted as the exposure to moisture increases; 2, that it is best to have freshly ignited magnesia, and to keep it in a dry place; 3, that it is better to have a damp magnesia to

begin with than to allow it to hydrate as pulv. rhei comp.; 4, that the hydration of the magnesia is the principal cause of the non-miscibility; and 5, that rhubarbs are important factors in producing non-miscibility, but less so than magnesia.

Mr. Mackenzie directed attention to the well-known fact, which is however frequently overlooked, that such powders are easily mixed with a very small quantity of water, after which the remainder of the water may be added. The addition of a small proportion of ponderous carbonate of magnesium had been found very advantageous.

Mr. Gilmour also spoke of *syrup of protochloride of iron* recently introduced in Edinburgh; it contains 2 grains of the salt to the drachm (see also page 129).

At the Pharmaceutical meeting held February 1, a valuable collection of specimens of the materia medica of Madagascar was presented by Dr. Parker, physician to the queen of that island, and was commented upon by Mr. Holmes, Dr. Parker and Mr. Baker, of the Royal Herbarium, Kew. Many of the specimens were from species hitherto unknown, and a number of them appear to be deserving of further investigation.

A paper was read by M. Mitchell Bird on *the amount of iodine present in codliver oil.* 5,000 grains of oil were saponified with alcoholic solution of potassa, the soap was incinerated in a crucible, the residue exhausted with water, the filtrate concentrated, then acidulated with sulphuric acid, filtered from the potassium sulphate and the liquid mixed with a few drops of potassium nitrite and an excess of starch liquor. These mixtures were compared with solutions of potassium iodide of known strength, treated with the reagents indicated. It was ascertained that 10,000 parts of the oil contained the following amounts of iodine calculated as potassium iodide: pale Norwegian oil ·21 and ·18, light brown Norwegian ·16, pale Newfoundland ·12, light brown Newfoundland ·14 parts. The amount of iodine yielded was in inverse proportion to their sensitiveness to cold. While all samples contained iodine, its amount was not at all approaching ·05 per cent., as has been stated by some authors.

A paper on *iodine-yielding algæ*, by James Wheeler, was also read (see page 124).

EDITORIAL DEPARTMENT.

LEGISLATION IN WEST VIRGINIA.—The objectionable bill before the Legislature of West Virginia, which in some of its provisions was strenuously objected to by the Pharmaceutical Association of that State (see p. 92 of February number), was defeated in the Senate on Feb. 20, it being indefinitely postponed by a vote of 16 to 6.

RAPID PREPARATION OF MERCURIAL OINTMENT.—An old druggist of Philadelphia writes that the solution of this question is a small quantity of spermaceti rubbed up in a warm mortar with mercury, when the globules of the latter will disappear in less than five minutes.

OBITUARY.

GEORGE PARKER KETTELL died at Charlestown, Boston, Nov. 13, 1881, where he had been in business for nearly forty years. He was a member of the Massachusetts College of Pharmay, and of the American Pharmaceutical Association.

PROF. ROBERT BRIDGES, M.D., died in Philadelphia Feb. 20, aged 76 years. A full biographical sketch of the deceased, who from 1839 to 1845 acted as associate editor, and from 1846 to 1861 as a member of the Publishing Committee of this journal, will doubtless be prepared by the proper committee of the Philadelphia College of Pharmacy, with which institution the deceased was connected for nearly fifty years. The following was adopted at a special meeting of the Board of Trustees, held Feb. 21st:

WHEREAS, Robert Bridges, M.D., who held the Chair of Chemistry in this College for thirty-seven years, deceased on the 20th inst., the Board of Trustees of the College desire to place on record their appreciation of the character of the deceased; therefore,

Resolved, That this Board express their high regard for the conscientious fidelity and undeviating integrity with which he discharged his duties as a professor.

With an unselfish disposition, he regarded the duties of a teacher as superior to personal advancement, and the even tenor of his course is marked by real work accomplished.

Resolved, That in the death of Dr. Bridges this College has lost a member who for nearly half a century has taken a lively interest in its affairs, and the Board of Trustees its chairman for many years.

Resolved, That the members of the Board, as a tribute of respect to the memory of their fellow-member, will attend his funeral.

THOMAS P. JAMES died at Cambridge, Mass., Feb. 22, in the seventy-ninth year of his age. He was born Sept. 1, 1803, at Radnor, Chester county, Pa., received his early education at Trenton, N. J., learned the drug business in Philadelphia, and afterwards was for many years in this city the proprietor of a wholesale drug store on Market below Eighth street. He joined the Philadelphia College of Pharmacy in 1838, served on the Publishing Committee from 1845 to 1849, and was elected to the Board of Trustees for a series of years. Botany was his favorite study, more especially the cryptogams, and he was elected Professor of Botany in 1864 by the Pennsylvania Horticultural Society, of which the deceased had been Secretary for 23 years. He had also been President of the Philadelphia Drug Exchange, Treasurer of the American Pomological Society and member of the American Philosophical Society and of the American Pharmaceutical Association. Since about the year 1869 he has been a resident of Cambridge.